ISSN: 2688-9323

# Spatial Differentiation and Influence Factor of Innovation Ability under the Concept of High-quality Development

## -- A Case Study of Foshan

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## Abstract

**The idea of High-quality development provides a new way to improve the innovation ability of cities. Taking Foshan City, Guangdong Province, as an example, the spatial pattern and obstacle factors of its innovation ability from 2013 to 2019 were studied using the entropy weight obstacle model. The results show that: (1) On the whole, the fluctuation degree of all conditions whole each region is small, Sanshui District and Gaoming District occupy evident, apparent stages, and Nanhai District is at a lower level. The input of innovation changed considerably in each area, and the highlands moved from Shunde and Nanhai to Sanshui. Shunde District is the stable center of innovation output in Foshan City, while Gaoming District is at a disadvantage and is at the end of innovation output. In terms of innovation environment, Chancheng, Nanhai, and Gaoming showed a downward trend, while the innovation environment level in Shunde and Sanshui showed a downward and then upward trend. (2) In 2013 and 2016, the obstacle degree of Foshan's innovation ability mainly comes from the dimension of the innovation environment. In 2019, it became an innovation output and innovation environment. The number of talents and basic facilities is the most significant obstacle factors affecting the innovation ability of Foshan City.**

## Keywords

**High-quality Development; Innovation Ability; Improved TOPSIS Model; Obstacle Factors; Foshan City.**

## 1. Introduction

During the 14th Five-Year Plan, China put forward the new development concept of innovation, coordination, green, openness, and sharing, reflecting the direction and focus of economic development. The core of the new development concept is High-quality development, which puts forward specific requirements for China's economic structure optimization, the transformation of old and new kinetic energy, social coordinated development, people's living standards, and green ecological civilization. It becomes the latest direction of China's economic development in the future [1]. At the same time, High-quality development is the transformation and upgrading of China's economic development to a certain extent; that is, the driving force of growth changes from extension to connotation. It is also the process of industrial transformation from low value-added labor to high value-added knowledge-intensive. However, the concept of High-quality development still has many difficulties in regional coordination, urban and rural construction, innovation management, and opening up, which need to be solved urgently. The key to High-quality development is to solve the problems of unbalanced and insufficient development, which needs to meet the region's actual needs to improve scientific and practicability [2]. At present, High-quality development research focuses

ISSN: 2688-9323

mainly on connotation characteristics, evaluation systems, and transformation paths. In terms of connotation, scholars pointed out that the purpose of High-quality development is richer than that of rapid growth, which should include economic development, urban and rural development, ecological environment, and people's life [3-4]; The characteristics of High-quality development mainly focus on rationalization of industrial structure, improvement of innovation ability, optimization of spatial layout, and governance of ecological environment [5]. In terms of the evaluation system of High-quality development, scholars had comprehensively considered the economic, social, ecological, and living aspects. They measured the process, motivation, and mechanism of High-quality development in multi-dimensional and stereoscopic ways with multi-scale empirical cases [6-7]. The transformation path, modern economic system, three significant changes (namely quality change, efficiency change, and power change), market mechanism, ecological civilization, innovation activities, and social security have become the main countermeasures for High-quality development [8-9].

Innovation-driven and technological breakthroughs have also become an essential cornerstone of High-quality development. An innovative city is a crucial engine for China to accelerate the transformation of economic development mode and improve international economic competitiveness, mainly driven by science and technology, talent, knowledge, and culture. In recent years, the pilot work of innovative cities has made remarkable achievements, but it is still in the primary stage [10]. At present, China's research of innovation ability mainly adopts a comprehensive index system combined with spatial analysis tools. It focuses on the spatial pattern evaluation of different scales such as the country, metropolitan area, and city. Scholars explained the driving factors of innovation output capability and its influence on regional innovation capability from innovation opportunities, innovation incentives, and innovation environment, and attention is paid to the role of innovation management mode in regional innovation synergy, innovation ecosystem, and risk response[11-12], to provide decision-making reference for the improvement of innovation capability under the background of High-quality development and point out the future development direction.

Foshan is China's only manufacturing transformation and upgrading of comprehensive reform pilot city. In the process of economic development, independent product innovation ability is not a robust and low level of modern industry, resources, and environmental protection problems [13]. Based on this, this paper constructed the evaluation system of Foshan's innovation ability from four dimensions; Meanwhile, entropy weight information is used to comprehensively evaluate spatial evolution, and the obstacle model is used to analyze the influencing factors of Foshan's innovation ability from 2013 to 2019. To improve Foshan's innovation ability, promote High-quality development, and provide a reference for the transformation and optimization of its industrial structure.

## 2. Methods

### 2.1. Theoretical Framework

Since the 21st century, green development has gradually become an important guiding concept of ecological civilization construction, global economic transformation, and reconstruction as the key to resolving the constraints of the natural environment, solving financial transformation problems, and realizing global sustainable development goals (SDGs) [14]. The report of the Nineteenth National Congress of the Communist Party of China refers to the modern economic system for the first time. The High-quality current financial system is an organic whole formed by the interconnection and mutual promotion of economic activities in different types and fields, involving multiple levels of development concept, institutional system, and financial motivation.  However, there are many problems in the industrial system, distribution system, regional development, technological innovation, and policy system, which

ISSN: 2688-9323

have become the fundamental direction and development trend of China's economic transformation and development. In economic structure transformation, science and technology and innovation drive are the endogenous dynamic mechanism and core focus of High-quality development of the modern financial system and regional economy. Guided by the concept of High-quality development and current economic system, this study draws on the theories of industrial spatial agglomeration, industrial location, scientific and technological innovation, and competitive advantage[15], and constructed a theoretical framework for the evaluation of urban innovation capability in the context of High-quality development around Foshan's development orientation in the Guangdong-Hong Kong-Macao Greater Bay Area and the construction of the " Guangzhou-Foshan " growth pole under the guidance of the development essence of " Green, Integrated, Patulous and Healthy."

## 2.2. Index System

Referring to the comprehensive evaluation of innovation capability [12, 16], this paper constructed the index system from the four dimensions of fundamental conditions, innovation input, innovation output, and innovation environment, as shown in Table 1.

**Table 1.** Evaluation Index

| Target layer | Criterion layer | Index layer(Unit) | Calculation method |
|---|---|---|---|
| Innovation ability | fundamental conditions C1 | $C_{11}$:Per capita GDP(Yuan) | GDP/ resident population |
| | | $C_{12}$:Per capita investment in fixed assets(10000 yuan/person) | Fixed assets investment / resident population |
| | | $C_{13}$:Air quality index (%) | Days of good air quality / 365 |
| | | $C_{14}$:Road network density($km/km^2$) | Total road length/district area |
| | Innovation investment C2 | $C_{21}$:Ratio of R & D(%) | R & D expenditure / GDP |
| | | $C_{22}$:Proportion of financial expenditure on science and technology(%) | Science and technology financial expenditure / total expenditure |
| | | $C_{23}$: Proportion of R & D personnel(%) | R & D personnel/total employed personnel |
| | Innovation output C3 | $C_{31}$:High tech product output rate (%) | $(A_i+B_i)/D_i$ |
| | | $C_{32}$:Patent application(piece) | - |
| | | $C_{33}$:Patent of invention(piece) | - |
| | Innovation environment C4 | $C_{41}$:Master degree and above in research institutions(-) | - |
| | | $C_{42}$:High tech Enterprises(-) | - |
| | | $C_{43}$:Scientific research institutions and universities(-) | - |
| | | $C_{44}$:Incubator and innovation space(-) | - |
| | | $C_{45}$:Number of hospital beds per 10000 population(-) | Number of hospital beds/resident population |
| | | $C_{46}$:Middle and Primary schools(-) | - |
| | | $C_{47}$:Green coverage rate of built-up area(%) | Green coverage area / built-up area |

Note: the output rate of high-tech products=(Ai+bi) /Di. Ai is the output value of the computer, communication, and other electronic equipment manufacturing industries; Bi is the output value of the instrument manufacturing industry, and Di is the total industrial output value.

## 2.3. Entropy Weight Method

Firstly, the dimensionless data of each index is processed, and then the weight of each index is calculated by the entropy weight method. The entropy weight method belongs to an objective assignment method, which determines the importance of each index according to the amount of information provided by each index. It can avoid the evaluation result error caused by the subjective judgment of the empowerment personnel [17]. Its main steps are as follows.

①Standardization: The positive index method is used to calculate the factors that positively impact innovation ability. The reverse index method is used to calculate the factors that have a negative effect. Positive indicators calculate the indicators of this Paper:

$$x'_{ij} = \frac{x_{ij} - \min_i\{x_{ij}\}}{\max_i\{x_{ij}\} - \min_i\{x_{ij}\}} \left(i = 1,2,\ldots, m;\ j = 1,2,\ldots, n\right) \tag{1}$$

②Index information entropy:

$$e_j = -\frac{1}{\ln m}\sum_{i=1}^{m}(Y_{ij} \times \ln Y_{ij}), \qquad 0 \le e_j \le 1 \tag{2}$$

Through formula 1-4, the importance of each index is calculated, as shown in Table 2.

**Table 2.** Index weight

| Target layer | Criterion layer | Index weight | | | Index layer | Index weight | | |
|---|---|---|---|---|---|---|---|---|
| | | 2013 | 2016 | 2019 | | 2013 | 2016 | 2019 |
| Innovation ability | fundamental conditions C1 | 0.177 | 0.168 | 0.194 | $C_{11}$ | 0.197 | 0.225 | 0.189 |
| | | | | | $C_{12}$ | 0.311 | 0.303 | 0.314 |
| | | | | | $C_{13}$ | 0.204 | 0.220 | 0.282 |
| | | | | | $C_{14}$ | 0.288 | 0.252 | 0.215 |
| | Innovation investment C2 | 0.174 | 0.157 | 0.160 | $C_{21}$ | 0.286 | 0.209 | 0.271 |
| | | | | | $C_{22}$ | 0.220 | 0.423 | 0.400 |
| | | | | | $C_{23}$ | 0.495 | 0.369 | 0.329 |
| | Innovation output C3 | 0.201 | 0.258 | 0.236 | $C_{31}$ | 0.293 | 0.224 | 0.166 |
| | | | | | $C_{32}$ | 0.478 | 0.489 | 0.437 |
| | | | | | $C_{33}$ | 0.228 | 0.287 | 0.396 |
| | Innovation environment C4 | 0.448 | 0.417 | 0.410 | $C_{41}$ | 0.191 | 0.235 | 0.260 |
| | | | | | $C_{42}$ | 0.141 | 0.134 | 0.133 |
| | | | | | $C_{43}$ | 0.104 | 0.107 | 0.112 |
| | | | | | $C_{44}$ | 0.144 | 0.110 | 0.100 |
| | | | | | $C_{45}$ | 0.237 | 0.228 | 0.213 |
| | | | | | $C_{46}$ | 0.114 | 0.117 | 0.119 |
| | | | | | $C_{47}$ | 0.070 | 0.069 | 0.063 |

In the formula, $Y_{ij} = \frac{x'_{ij}}{\sum_{i=1}^{m} x'_{ij}}$, m and n are the numbers of administrative districts in Foshan City and index factors.

③Redundancy of information entropy:

ISSN: 2688-9323

$$d_j = 1 - e_j \quad (3)$$

④Index weight:

$$\omega_j = d_j / \sum_{j=1}^{n} d_j \quad (4)$$

### 2.4. Obstacle Degree Model

Through the model, the obstacle coefficient of each factor to the improvement of innovation ability is calculated, and the main obstacle factors of each administrative region can be diagnosed, which provides the demonstration basis for the comprehensive analysis of innovation ability in different years.

## 3. Study Area and Data Sources

Foshan City is located on the west bank of Guangdong-Hong Kong-Macao Greater Bay Area. Relying on special geographical conditions, Foshan's export-oriented economy is developed. Many industrial products are sold to the international market every year. Still, most of these industries are primary manufacturing, at the bottom of the industrial chain, and have low economic benefits. Foshan is a big manufacturing city; the secondary sector is still in a dominant position in the industrial economy, the proportion is still more than 50 %, the balance of manufacturing output value is high, electrical machinery and equipment manufacturing industry, metal products industry, non-ferrous metal smelting, and non-metallic mineral products industry and textile industry accounted for a large proportion. However, the low ratio of the tertiary sector and high-tech is not conducive to the High-quality development of Foshan.

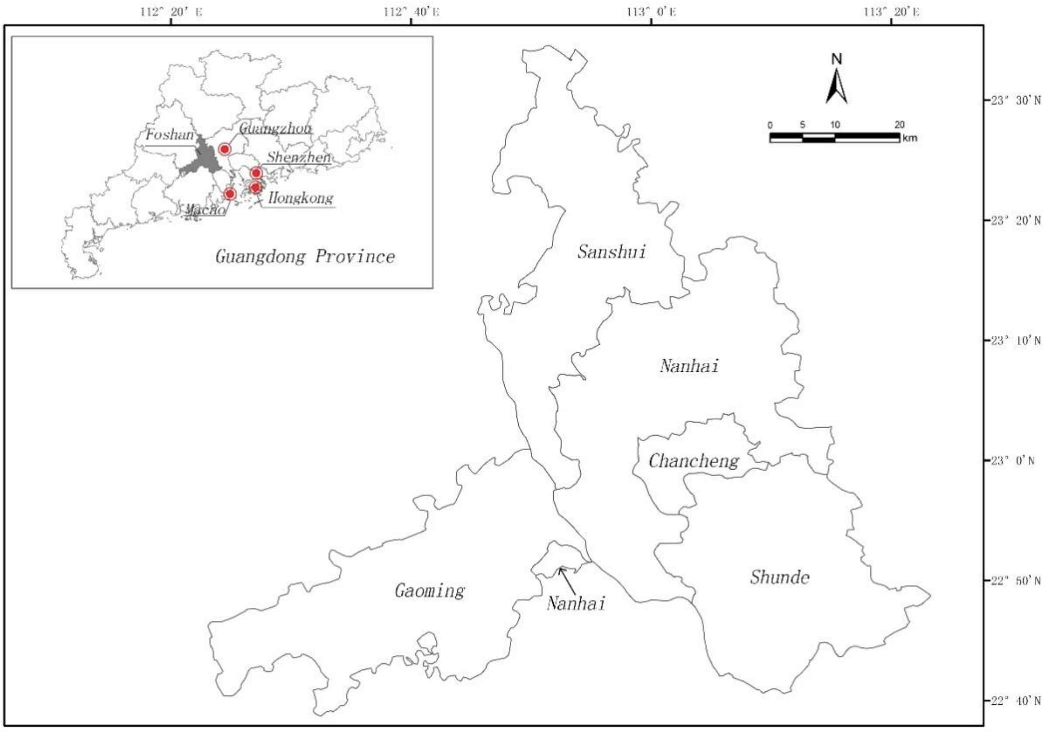


**Fig 1.** Location of the study area

The research data are collected through 2014, 2017, and 2020 Foshan statistical yearbook, statistical yearbook of each district, and national economic and social development bulletin. In the innovation environment, the information of Foshan high-tech enterprises is inquired and

ISSN: 2688-9323

screened by the official website of enterprise investigation. The scientific research institutions and universities, incubators, and mass creation spaces are obtained through the inquiry of open information platforms of Foshan Science and Technology Bureau and other governments.

# 4. Result Analysis

## 4.1. Innovation Capability Dimension

### 4.1.1. Fundamental Conditions

The western part of Foshan City is better than the eastern part (Figure 2), and the Sanshui District and the Gaoming District have apparent advantages. The population of the two districts is smaller than that of other administrative regions. The per capita GDP and the per capita completion of fixed asset investment account for a higher proportion in this index level. The air environment quality is better than that of other regions. Foshan City provides an excellent economic foundation and environmental conditions for developing innovation activities, but its road network density is relatively low. By comparison, the primary needs of Nanhai District are at a lower level in Foshan City, and all the other three factors are at a disadvantage except for the road network density. Except for the Sanshui area, the Ci valregions of all other regions decreased in 2019. Air quality critical post important factor, which showed that the environment played a more crucial role in economic and technological development.

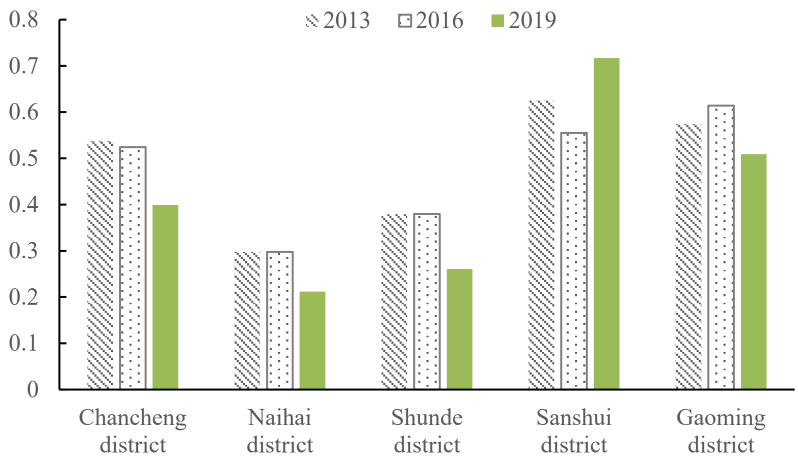


**Fig 2.** Foshan's Innovation conditions for 2013, 2016 and 2019

### 4.1.2. Innovation Input

The time invested in innovation in Foshan has changed dramatically in each region, and the highlands have gradually shifted from Shunde and Nanhai to Sanshui (figure 3). Both Chancheng and Nanhai were the lowest in 2016, while Sanshui and Gaoming were the highest in 2016, and Shunde showed a downward trend. Sanshui District is the region where the growth of innovation investment is most apparent. Shunde District, which has been investing a more significant proportion in 2019, has a higher proportion in the total financial expenditure of science and technology than other regions. However, its R&D expenditure and employment are still minimal. As the downtown area of Foshan, the tertiary industry occupies a higher proportion than the industry, and the number of relevant enterprises is small. Therefore, the innovation input of Chancheng District has been at the lower level in the city [11], and its Ci value was 0 in 2016. But in Gaoming District, due to the relatively backward economic development, there are fewer enterprises with innovation activities and R&D institutions in the district, so the investment is also tiny. Although innovation input has decreased in Nanhai and Shunde districts, Ci is still around 0.5.

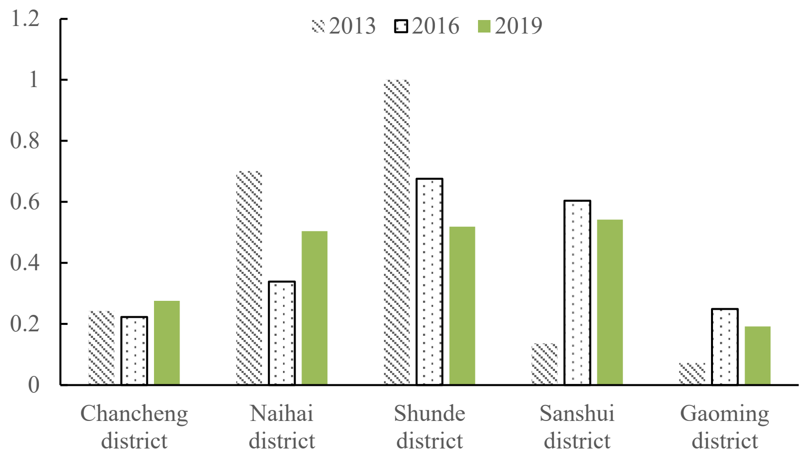


**Fig 3.** Foshan's Innovation input for 2013, 2016 and 2019

### 4.1.3. Innovation Output

The change range of innovation output is relatively small, and its Ci value is relatively low. As shown in Figure 4, Shunde District is a stable innovation output center in Foshan City. In recent years, Shunde District has been in a critical period of technological transformation. There are many intelligent equipment enterprises in the District with many R&D institutions, frequent activities, and more High-quality labor input. Even though its innovation input shows a downward trend, its Ci shows a steady increase in the number of research years, and its innovation efficiency is high. Sanshui District is like a high place of innovation input. However, its disadvantage in the number of R&D enterprises and High-quality talents makes its output capacity to a certain extent lower in the City, and Ci fluctuates around 0.15, and its innovation efficiency is low. Because the number of patent applications and influential inventions in Chancheng District is less than that in other areas, the Ci value of Nanhai District is not high all the time, while Gaoming District is at the end of Foshan City's innovation output because of all the factors.

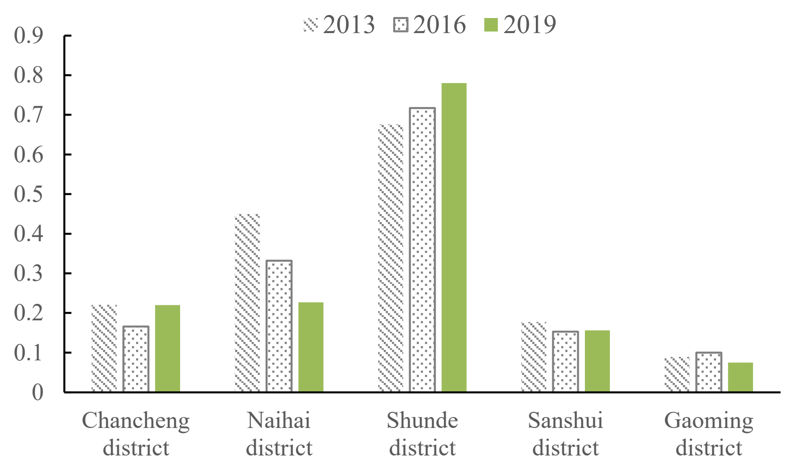


**Fig 4.** Foshan's Innovation output for 2013, 2016 and 2019

### 4.1.4. Innovation Environment

The trend of the innovation environment in Foshan is different in time. The Ci value in Chancheng, Nanhai, and Gaoming districts is 0 in 2016 and 2019. The innovation environment level in the Shunde district is increasing. The innovation environment level in Sanshui district shows a trend of decrease first and then rise. There is a slight variation in distribution, with a southern preference over the northern and an eastern preference over the western (figure 5).

ISSN: 2688-9323

According to the data obtained, the innovation environment's elementary and secondary school facilities indexes change little in different research years. All the indexes in the five regions show an upward trend. On the whole, the innovation environment with a higher level of economic and social development is better, which can attract the investment and accumulation of innovative enterprises, and the excellent allocation of service facilities is conducive to attracting talent employment, carrying out innovation and technological research activities, such as Shunde District and Chancheng District. Conversely, the conditions are poor, such as Sanshui District and Gaoming District.

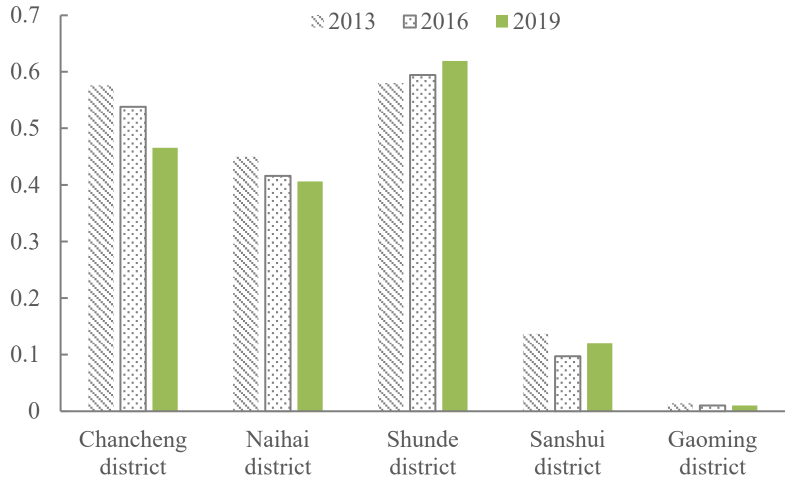


**Fig 5.** Foshan's Innovation environment for 2013, 2016 and 2019

### 4.1.5. Summary

As shown in Table 3, there was little change in distorting its innovation ability ranking. Shunde District was always the innovation highland of Foshan, and the Ci value was stable above 0.6. Although the Ci value of Nanhai District had a downward trend, it was a vital force of industrial and technological innovation of Foshan city. Shunde District mainly developed high-end technology research and development, such as robots and automation, while Nanhai district developed invention and upgrading for industrial production technology. Although the Ci value of Chancheng District was lower than that of Nanhai District, it remained stable. Although the ranking of Sanshui District was not high, the growth rate of its innovation ability was the most obvious among the five districts.

**Table 3.** Temporal variation of innovation ability in Foshan

| | $sep^+$ | | | $sep^-$ | | | $C_i$ | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2016 | 2019 | 2013 | 2016 | 2019 | 2013 | 2016 | 2019 |
| Chancheng district | 0.175 | 0.207 | 0.211 | 0.153 | 0.133 | 0.126 | 0.468 | 0.39 | 0.374 |
| Nanhai district | 0.166 | 0.198 | 0.194 | 0.154 | 0.127 | 0.119 | 0.482 | 0.39 | 0.381 |
| Shunde district | 0.127 | 0.128 | 0.137 | 0.207 | 0.213 | 0.208 | 0.62 | 0.625 | 0.604 |
| Sanshui district | 0.223 | 0.227 | 0.21 | 0.088 | 0.104 | 0.117 | 0.282 | 0.315 | 0.358 |
| Gaoming district | 0.238 | 0.239 | 0.24 | 0.077 | 0.08 | 0.07 | 0.245 | 0.25 | 0.226 |

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## 4.2. Obstacles of Factors

Talents and infrastructure are essential parts of the innovation environment. High tech personnel are among the most active subjects in innovation activities, which can fully play the knowledge spillover effect; infrastructure is also critical for talent employment and enterprise investment [18]. As shown in Table 4, the obstacle factors of all districts mainly came from the dimension of the innovation environment in 2013. Except for Chancheng District, the number of beds per ten thousand population (C45) was the first obstacle in all other districts. Shunde District had the highest obstacle factor, followed by Nanhai District. Both of them were the frontier of Foshan's innovation ability. Their medical service level was still tense compared with social development; it had become the main factor restricting innovation development. In the research institutions, the number of masters and above (C41) was the first obstacle factor of Chancheng District, but also the second obstacle factor of Nanhai District and Gaoming District, which indicated that there was a shortage of high-tech talents in the three districts, which was not conducive to innovative technology research and development. The lack of high-tech talents makes the number of patent applications in Chancheng and Nanhai District less, impacting their innovation output.

In 2016, the innovation environment was still the most significant obstacle dimension, but the order of obstacle factors changed significantly. Compared with 2013, the number of beds per 10000 population (C45) in each district decreased and became the second obstacle in Sanshui District and Gaoming District, while the number of masters and above (C41) in research institutions became the first obstacle. In addition, except Shunde District, the obstacle degree of patent applications (C32) in each district has increased, which indicates that Shunde District had a substantial output capacity and also reflects the imbalance of Foshan's innovation output in spatial distribution to a certain extent because most of the high-tech personnel are concentrated in Shunde District, which led to this phenomenon. On the whole, the first obstacle degree of each district had decreased, which was conducive to the improvement of its innovation ability. Still, the innovation output obstacle degree has increased, and the spatial distribution of patent applications and effective invention patents is unbalanced.

**Table 4.** The top five obstacle factors of innovation ability

| District | | Ranking (2013) | | | | | Ranking (2016) | | | | | Ranking (2019) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Chanchen-g district | Index | C41 | C42 | C32 | C23 | C46 | C41 | C32 | C42 | C33 | C46 | C41 | C32 | C33 | C42 | C46 |
| | Ui | 22.6 | 16.4 | 11.6 | 9.8 | 9.7 | 20.6 | 19.3 | 11.5 | 10.8 | 7.7 | 24.2 | 14.1 | 12.8 | 10.7 | 7.3 |
| Naihai district | Index | C45 | C41 | C32 | C11 | C12 | C45 | C41 | C32 | C33 | C22 | C41 | C45 | C32 | C33 | C12 |
| | Ui | 31.2 | 25.6 | 11.5 | 6.2 | 4.5 | 23.7 | 21.6 | 18.8 | 9.0 | 6.5 | 23.1 | 21.9 | 11.9 | 11.3 | 7.0 |
| Shunde district | Index | C45 | C47 | C43 | C31 | C12 | C45 | C31 | C43 | C47 | C12 | C45 | C43 | C12 | C47 | C22 |
| | Ui | 40.2 | 14.5 | 14.5 | 10.6 | 10.1 | 32.7 | 15.1 | 14.0 | 12.1 | 8.6 | 28.6 | 13.1 | 11.6 | 10.4 | 9.9 |
| Sanshui district | Index | C45 | C44 | C42 | C41 | C32 | C41 | C45 | C32 | C33 | C42 | C41 | C45 | C32 | C33 | C42 |
| | Ui | 20.2 | 12.8 | 12.2 | 9.6 | 8.2 | 17.9 | 16.5 | 13.9 | 8.3 | 8.3 | 20.3 | 14.9 | 11.2 | 10.0 | 8.9 |
| Gaoming district | Index | C45 | C41 | C44 | C42 | C46 | C41 | C45 | C32 | C42 | C46 | C41 | C45 | C32 | C42 | C33 |
| | Ui | 17.7 | 14.6 | 11.0 | 10.8 | 8.7 | 16.4 | 15.9 | 12.5 | 9.3 | 8.1 | 17.5 | 14.4 | 9.7 | 9.0 | 8.4 |

In 2019, the obstacles of innovation output and innovation environment in each district were still tremendous. Except for Shunde District, the first obstacle degree of each section was the number of masters and above in research institutions (C41). With the more and more frequent innovation activities, the demand for talents is higher and higher. Compared with 2016, except for Shunde District, the main obstacle factors had little change, and the ranking was relatively stable. The first three obstacle factors and scale of Nanhai, Sanshui, and Gaoming District were consistent, and the number of effective invention patents (C33) was higher. These showed that the lack of highly educated talents in Foshan City had become the main limiting factor of innovation and development. High-quality talents will be the critical factor in improving its innovation ability in the future.

## 5. Conclusion and Discussion

### 5.1. Conclusion

(1) From each district's four dimensions of innovation ability, Sanshui and Gaoming District have better primary conditions, and the innovation environment plays an increasingly important role in improving innovation ability. Nanhai and Shunde District are the highlands of innovation investment. After 2019, Sanshui District becomes the area with the most innovative investment in Foshan. Sanshui District has good primary conditions for innovation, with more input but less innovation output, and its input-output is relatively low. Gaoming District belongs to the area with better primary conditions, insufficient investment in innovation, and a low level of innovation environment. Chancheng District has an advantage in the innovation environment, but its benefit in input and output is not apparent.

(2) In the obstacle dimension, the obstacle degree of innovation environment is the biggest, the critical factor affecting Foshan's innovation ability, but it shows a downward trend. In terms of obstacle factors, the number of masters and above (C41) and the number of beds per 10000 people (C45) is the most prominent obstacles in research institutions, and the barriers of innovation output factors such as patent applications (C32) and effective invention patents (C33) have an apparent upward trend.

### 5.2. Discussion

Foshan City is an essential member of the Guangdong-Hong Kong-Macao Greater Bay Area. Its development in the Greater Bay Area is positioned as a senior manufacturing center and a pilot center for manufacturing transformation and upgrading. The change of Foshan’s manufacturing industry and upgrading the high-tech sector are the main breakthrough points affecting its High-quality economic and social development. They are also the main pain points under the new development pattern of the " double cycle. " This paper explores the spatial evolution of innovation capability and obstacles in Foshan in 2013, 2016, and 2019 through 17 indicators in four dimensions, which is conducive to the High-quality development of Foshan and the construction of a modern economic system. However, due to the limitations of data sample acquisition, there are still many dimensions of innovation output not considered in this innovation capability evaluation study, such as the proportion of high-tech market transaction contract amount to GDP, high-tech enterprise type segmentation, etc. At the same time, the impact analysis of barriers to innovation capability is mainly explored from quantitative models. In the later period, we can combine the methods of new economic geography such as “institutional turn” and “cultural turn” to analyze the characteristics of innovation activities from social culture, local management, behavioral preferences, environmental regulation, and other factors, and summarize the impact mechanism of innovation capability more comprehensively and scientifically, which will become the main direction of later research.

## Acknowledgments

We are grateful for the financial support for our initial and ongoing research from the social science characteristic innovation project of Guangdong Provincial Department of Education (2020WTSCX136); Project of the 14th five-year plan for the development of philosophy and Social Sciences in Guangzhou (2021GZYB22); Special topic of "public management" project of the distinct key discipline of Guangdong Province (2017STSZD01).

ISSN: 2688-9323

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