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Article

Research on the Ability of Independent Innovation of Cities Based on the Concept of Sustainable Development

——Taking Guangzhou as an example

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Abstract : Based on the deployment of global innovation value chain, the article analyzes the existing independent innovation capability of Guangzhou, and analyzes in detail from innovative talents, innovation system, innovation culture and innovation environment. The role of the central city of Guangzhou has led to research on issues such as the common development of cities in Guangdong and the Pearl River Delta. Using the combination of qualitative analysis and quantitative analysis, we can find out the shortcomings of Guangzhou's independent innovation capability, explore the causes of problems, and seek solutions to the main problems.

Key words: Innovative talents;Innovation system;Innovation culture; Innovation environment

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1. Introduction

Guangzhou is the capital of Guangdong Province and the central city of China，which is an important political, military, economic, cultural and scientific center in South China. It has been ranked as the world's first-tier city by GaWC, the world's most authoritative world city research institution. The economic development capacity of Guangzhou headquarters and the total stock of Grade A office buildings rank among the top three in the country. The total number of Fortune 500 companies investing in Guangzhou has reached 297[1]. In 2016, Guangzhou's regional GDP was 1,954.744 billion yuan, an increase of 8.2% over the previous year. The per capita GDP was 141,933 yuan. The per capita disposable income of Guangzhou residents was 50,941 yuan, ranking first in the province (Guangzhou). Yearbook, 2017). Guangzhou's comprehensive strength ranked first in China's “City of Opportunity” for two consecutive years in 2016 and 2017. In 2017, Guangzhou's GDP exceeded that of Singapore, surpassing the 2 trillion yuan mark.

The main experience of Guangzhou's rapid development is to seize the favorable opportunity of economic transformation in developed countries, use abundant labor, attract foreign investment, and vigorously develop labor-intensive export processing industries. However, in the 40 years of reform and opening up, Guangzhou faces rising labor, land and other costs. Hu Dali (2014) [2] believes that the excessive growth of labor and natural resources is unsustainable, so the economic transformation and upgrading is imminent. To maintain sustainable economic development and get rid of the "middle income trap", we must continue to upgrade

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the industry, enhance the ability of independent innovation, and give new energy to economic development.

Recently, China's National Bureau of Statistics released the "Statistical Bulletin on National Science and Technology Funds in 2017". The communique shows that in 2017, the country invested a total of 176.61 billion R&D expenditures, an increase of 12.3% over the same period, and the ratio of GDP to GDP was 2.13%, an increase of 0.02 percentage points over the previous year. From the perspective of R&D expenditures in various provinces in China, Guangdong is the province with the largest R&D expenditure in the country, reaching 234.36 billion. From the perspective of Guangdong Province, Shenzhen is the city with the largest R&D expenditure in Guangdong. In 2016, its R&D expenditure reached 80 billion, accounting for 4.1% of GDP, ranking third in the country. Guangzhou's R&D expenditure in 2016 was about RMB 45.1 billion. The proportion of GDP is only about 2.3%, ranking fifth in the country. From the perspective of R&D, in 2016, Shenzhen and Guangzhou each owned 95,730 and 30,305 invention patents.

From the gap in research and development, we can also see the gap in economic development. According to the GII (Global Innovation Index Report) assessment, the Shenzhen-Hong Kong Consortium's innovation index surpassed Silicon Valley in 2016, ranking second in the world. In 2017, Shenzhen's GDP surpassed Guangzhou and achieved a historical leap. As the provincial capital of Guangdong and the central city of the Pearl River Delta, Guangzhou is indeed worthy of serious consideration in how to maintain its leading position in the future development.

The main purpose of this paper is to study the analysis of Guangzhou's independent innovation ability under the background of global innovation value chain, find out the shortcomings of Guangzhou, explore the causes of problems, seek solutions to major problems, and promote Guangzhou's independent innovation. The road to development.

2. Literature Review

The word "Innovation Chain" was first proposed by Turkenburg. Later, after continuous research and exploration by scholars from various countries, its structure and level were gradually established. As of now, the meaning of the innovation chain has been very rich and covers many fields. Wu Xiaobo (2008) [3] believes that the innovation chain is a methodology for systematic understanding of technological innovation, and is a sequence of a series of functional activities covered by innovation. Zheng Wenfan (2018) [4] believes that the innovation chain can be divided into five branches: "scientific innovation chain, technology innovation chain, engineering innovation chain, industrial innovation chain, institutional innovation chain." Each of the innovation chains has its own connotations and characteristics, and has different forms of expression. The technology innovation chain is represented by basic research. Secondly, the technology, engineering and industrial innovation chains are respectively represented by applied research activities, experimental development and industrialization of scientific and technological achievements, while institutional innovation is characterized by the creation of corresponding technological production relations and superstructure. In short, the innovation chain refers to the whole process involving multiple subjects, using multiple elements,

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going through multiple steps, crossing multiple time and space, and achieving the final result and realizing value creation.

From the above various expressions of the innovation chain, it can be found that the value chain and the innovation chain are not completely separated and irrelevant. In his book Economic Development Theory, Joseph Alois Schumpete shows that the input and output of knowledge technology is an innovative process, and innovation essentially establishes a production function. The upgrading of the value chain relies on the drive of innovation. The purpose of innovation is to enhance the competitiveness of the industry. Therefore, the innovation chain and the value chain complement each other and depend on each other. Through the front-end delay, back-end forward, intermediate linkage, chain flow orientation, and element re-engineering, the value chain and the innovation chain are organically integrated to form an innovative value chain.

Zhang Zhanren and Li Yili (2015) [5] believe that the rapid development of science and technology has changed the form of knowledge existence and shortened the cycle of knowledge renewal, which has made the urgency of international enterprises to carry out transnational R&D cooperation continuously. The smooth spread of Internet, wired and wireless communications, and convenient global transportation have led to a significant decline in cross-border R&D costs and a significant increase in R&D efficiency. This has enabled a number of R&D institutions, manufacturers, and suppliers to conduct extensive scientific research cooperation, creating convenient conditions for international R&D investment transfer of multinational companies. At the same time, the modular coding of knowledge has led to revolutionary innovations in innovation, from centralized to modular, decentralized, from a single country, to a company, to interdependent but vertically separated. International division of labor and cooperation. R&D commissioning, R&D outsourcing, open global R&D, and the use of global innovation resources have accelerated the process of R&D, which has formed a global innovation chain.

Ma Lin and Wu Jinxi (2011) [6] believe that GIC refers to the value network innovation model in which enterprises search for available knowledge resources, pay attention to resource use rights, and have a high degree of openness. The author believes that the global innovation chain is based on innovative processes (such as basic research, applied research, technology development, transformation of results, new product launch, continuous improvement, etc.), with the respective comparative advantages of the innovation entities, focusing on one or more innovation core divisions of labor, A global innovation chain organization that integrates global innovation resources, improves the innovation ecosystem, and improves innovation efficiency. The global innovation chain accelerates the dissemination and diffusion of knowledge, reduces the transaction cost of knowledge, and increases the accumulation of knowledge.

3. Methodology And Data Analysis

3.1 Innovative Talent Analysis

The Global Competitiveness Report (2005-2006), led by the Chinese Academy of Social Sciences and the American Baknell University, and the eight countries of the United States, China, Canada, and Italy, has proposed a decisive role in the improvement of urban competitiveness. It is not an industrial cluster, but a talent

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factor. The aggregation of talents has “multiplier effect” and “scale effect”, and the collection of talents is closely related to the urban environment, especially the innovation environment and living environment. The contribution of the two indicators of innovation environment and living environment to urban competitiveness is located in the first place[7]. The 19th National Congress proposed to "cultivate a large number of strategic scientific and technological talents, scientific and technological leaders, young scientific and technological talents and high-level innovation teams with international standards"[8] .Therefore, Guangzhou, as a regional central city, wants to Winning and maintaining the initiative in the fierce competition is naturally inseparable from the support of innovative talents.

However, with the rising of the economy in other parts of the country, in the face of the fierce competition for talents, the existing human resources advantage of Guangzhou faces new challenges from other regions in the country and global competition, especially in comparison with Beijing, Shanghai and Shenzhen. The number and achievements of innovative talents are not optimistic in Guangzhou. From the perspective of the number and quality of universities in Beishangguangshen and Shenzhen, there are only 2 985 engineering colleges in Guangzhou (Zhongshan University, South China University of Technology), and only 4 institutions of 211 projects (Zhongshan University, South China University of Technology, Jinan University, South China Normal University; and Beijing's 985 engineering colleges have 10 (Peking University, Tsinghua University, Beijing Institute of Technology, Beijing University of Aeronautics and Astronautics, Beijing Normal University, Renmin University of China, China Agricultural University, Central University for Nationalities, Peking Union Medical College, Peking University School of Medicine), there are 27 colleges and universities in 211 projects; there are 5 985 engineering colleges in Shanghai (Fudan University, Tongji University, Shanghai Jiaotong University, East China Normal University), and 211 engineering institutions have 10 schools. However, in terms of quantity, the number of high-level universities in Guangzhou is far less than that of Beijing and Shanghai. However, the university cultivates and develops important training dishes for innovative talents. From the perspective of the quality of colleges and universities, according to the latest national comprehensive strength of 2018 In terms of ranking, only one university in Guangzhou (Zhongshan University) ranks in the top 10, ranking 9th, while the top 10 universities are basically located in Beijing and Shanghai. Therefore, in terms of the quality of colleges and universities, there is a comparison between Guangzhou and Beijing and Shanghai. Big gap. From the perspective of the level and number of college graduates: In 2016, the master's degree in Beijing was 2.8 times that of Guangzhou, and the doctoral graduate was 4.9 times that of Guangzhou (Figure 1). From the quantitative analysis of patent authorization: the number of Beijing, Shanghai, and even Shenzhen is much higher than that of Guangzhou. If the number of patents is used to measure the achievements of innovative talents, it can be clearly seen from Figure 2 that the results of innovative talents in Guangzhou are far less than those in Beijing. The number of patents granted to Shanghai and even Shenzhen is higher than that of Guangzhou.

In addition, more importantly, Guangzhou's technology market is not high. Guangzhou is located in the provincial capital of Guangdong Province. The government supervision will be stronger than other cities. Compared with Shenzhen and Shanghai, many R&D investments in Guangzhou are government investment,

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while Shenzhen and Shanghai research and development. Most of them are private investment. The private investment will increase the input-output ratio and the marketization of research and development results. The research and development achievements of Guangzhou universities are mostly used for promotion titles and awards. They have not obtained the market for trading, and they are used in production and turned into productivity. The research and development results have not been used effectively. The marketization rate of talents in Guangzhou is relatively low. The scientific and technological talents are concentrated in colleges and universities, the lack of talents in enterprises, and the inability of talents to flow. The mechanism of attracting international talents is poor and rigid, which has led to poor innovation resources in Guangzhou. The market for research and development funds in Guangzhou is low. Shenzhen's R&D funds are basically enterprise investment. Among them, Huawei's R&D investment accounts for 15% of sales revenue, and R&D intensity is large. Guangzhou's investment only accounts for 2.3% of GDP. The research and development of funds is inefficient.

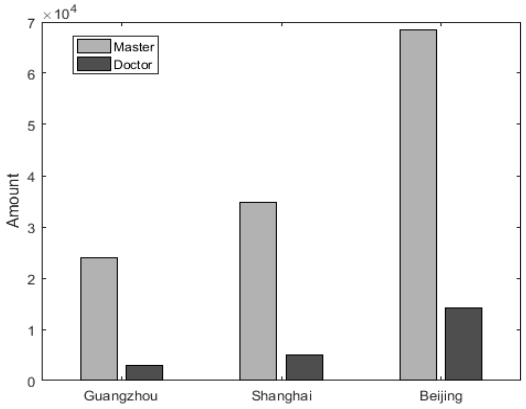

Figure 1 Number of graduates in 2016

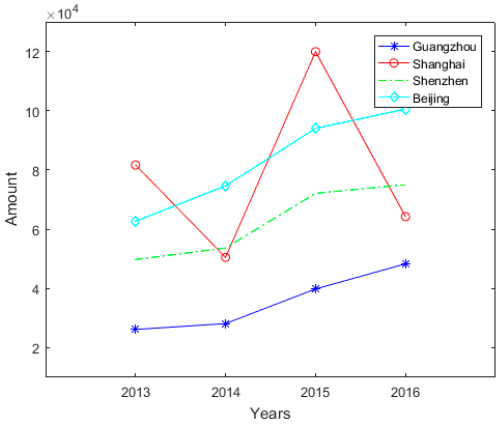

Figure 2 Number of granted patents in 2013-2016

3.2 Innovation System Analysis

Institutional innovation is a powerful driving force for social development and progress. It is the basic premise and important guarantee for improving the vitality of urban development. Modern cities need to improve their scientific level through institutional innovation. In the global innovation chain, institutional innovation and technological innovation interact and complement each other, forming an organic whole that promotes innovation and even the society's continuous development. Under the background of globalization, the competition between cities is becoming more and more fierce. How to reduce operating costs, expand profit margins, improve economic and social benefits through institutional innovation, and create a market environment and cultural environment conducive to the accumulation of modern economic development factors. And the policy environment determines the international status of a city's development. It can be said that the dependence on institutional innovation is an inevitable law of modern urban development[9].

According to the economic data released by Guangzhou City in 2016, the overall performance is good: the city's GDP (GDP) reached 1,961.094 billion yuan, an increase of 8.2% year-on-year, and the growth rate led the country by 6.7% and the

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province's growth rate of 7.5%; The public budget revenue was 139.385 billion yuan, up 5.2%; the total retail sales of consumer goods was 870.649 billion yuan, up 9.0% year-on-year; the consumer price of urban residents rose 2.7% year-on-year.However, Shenzhen's GDP has exceeded 2 trillion yuan (2007.858 billion yuan). For the first time, it exceeded Guangzhou (1980.542 billion yuan). At present, China's economic growth has been transformed from factor-driven to innovation-driven, and the essence of innovation-driven is actually institutional innovation, and through institutional innovation to promote innovation in the fields of science and technology, investment management system, trade liberalization, etc., Guangzhou and neighboring Shenzhen Compared, the motivation for institutional innovation is still insufficient.

In the early stage of reform and opening up, Guangzhou took the lead and dared to try it. It developed rapidly and benefited from the relaxed environment of the whole country and the historical mission and sense of responsibility of the Guangzhou leadership. The result is not only economic strength, but also comprehensive competitiveness in the country, and it is second to none in terms of market power, appeal, propaganda and other "soft power." However, in the following period, Guangzhou only focused on development, talked about reforms, and improperly “before the birds”. “Soft power” lags far behind the accumulation of “hard power”. The feeling of gradual recovery has been gradually recovered since the new millennium, and reform and development have gradually taken the lead. For more than three decades, the “soft power” aspect also seems to form a “smile curve” [10].

In addition, the Guangzhou economy is facing the squeeze of low-end manufacturing from Southeast Asian countries and regions, as well as the extrusion of high-end manufacturing from the United States, Germany and Japan. It must stand out under the double squeeze. Guangzhou can only rely on new industries. New technologies and new economies. Faced with this kind of economic situation, Guangzhou promoted institutional innovation-supply-side structural reform, but the effect of supply-side reform in Guangzhou is not significant. The performance of de-capacity and de-stocking is not obvious. The main reason is labor. The rapid increase in costs has greatly reduced the operating efficiency of many companies.

Therefore, in promoting the construction of the innovation chain in Guangzhou, Guangzhou can only achieve real improvement in labor productivity under the new economic normalization by relying on further institutional innovation, and strive for upstream in the value chain. The sustainable growth of Guangzhou's economy depends on labor. The reform of production efficiency relies on being the central city and provincial capital of South China to form comprehensive competitiveness, and highlights its important role in the process of using China to open up and reform.

3.3 Innovative culture analysis

Innovation culture construction is the premise and foundation for enhancing innovation ability. Innovation culture is a cultural form conducive to scientific and technological innovation. It is the sum of innovation spirit, innovation concept, innovation value, innovation system, innovation mechanism and innovation environment. It can be divided into two aspects: internal culture and external culture. The inner innovation culture refers to the spirit, concept and values of innovation; the external innovation culture refers to the innovative system, mechanism and environment. The concentrated expression of innovation culture is the environment and mechanism that advocates science, dares to be first, encourages innovation, and

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tolerates failure.

From a horizontal perspective, especially in comparison with other advanced science and technology innovation cities in China, there is still a big gap in Guangzhou. This is an indisputable fact. Statistics show that in terms of technological innovation, Guangzhou is clearly behind advanced cities such as Beijing, Shanghai and Shenzhen. Some important indicators, such as technology investment, technology introduction, digestion and absorption, total value of high-tech products, etc., are not only far lower than Shenzhen, Shanghai, Beijing, but also significantly lower than Hangzhou, Tianjin, Nanjing and other cities. Not only that, in recent years, the above gap has shown a gradual increase.

From a vertical perspective, from the 1980s to the early 1990s, Guangzhou mainly made a large number of traditional manufacturing in Hong Kong through the processing of incoming materials, sample processing, assembly and compensation trade (referred to as "three to one supplement"). After the 1990s, the technology development model of international industry, capital, technology and equipment was widely accepted through OEM (fixed-point production). Although it quickly and effectively improved the level of economic development in Guangzhou, It has shortened the technological gap with developed countries, but it has a fatal weakness. It is highly dependent on foreign technology and brand. It not only limits the autonomy of core technologies and the acquisition of independent intellectual property rights, but also attracts foreign investment. Under the influence of inertia thinking, it is easy to ignore the cultivation of local entrepreneurs. Because the long-term path dependence on "introduction" will result in the lack of innovation consciousness of local entrepreneurs and the weakening of innovation enthusiasm, the ability of independent innovation of enterprises will not be improved as expected.

We know that the most commendable thing about this ancient cultural city in Guangzhou is that it has a profound open consciousness and a humanistic character of "Dare to be the first". This is the most important foundation for the formation of a culture of innovation, and it contains a powerful driving force for the continuous development of the city of Guangzhou. However, reform, opening up, and economic and social development have entered a new stage of comprehensive transformation and upgrading. Continue to maintain Guangzhou's original innovation culture will undoubtedly hinder Guangzhou from building an upstream value chain and gaining more labor added value. Guangzhou must face how to accelerate its improvement. The severe challenge of independent innovation capability. Whether it is from the historical responsibility of building an important national central city or the inevitable requirement of building a hub-type network city, it is an urgent task to establish innovative development concepts, cultivate innovative culture, and enhance innovation capabilities.

3.4 Innovation environment analysis

The existing theory of innovative cities believes that innovative cities are an urban development model with innovation as the core driving force[11]. The state of urban innovation environment is an important aspect to measure a city's ability to innovate, while quantitative analysis of urban In order to innovate the environment, we must first select the indicator system that expresses its innovation environment. The previous literature mainly considers the urban innovation environment indicator system from the perspective of the urban innovation environment itself. There are

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many influencing factors of the urban innovation environment, Li Meng et al. (2012) [12] Through the in-depth analysis of the factors influencing the innovation environment, the urban innovation environment is divided into four subsystems: policy and legal environment, innovation basic environment, humanistic environment and innovative service environment. A total of 44 indicators are used for principal component analysis, and on this basis, The evaluation index system of urban innovation environment and the comprehensive evaluation model of urban innovation environment based on analytic hierarchy process.

In order to analyze the impact of urban innovation environment on the division of labor of Guangzhou's global value chain, this paper selects several indicators by following the principles of scientificity, systemicity, and operability. Refer to the calculation method of Xie Xuxia et al. (2016) [13]. The mean square error method is used to determine the weight of each indicator, and the innovation environment in Guangzhou is quantitatively analyzed and compared with Beijing and Shanghai.

(1)Indicator And Illustrative

In the process of urban innovation and development, urban innovation environment and urban innovation resources, urban innovation and development are mutually influential and interacting. Government, enterprises, scientific research institutions and other departments promote urban innovation under the influence of innovation mechanism by investing in urban innovation resources. Development, in this process, the urban innovation hard environment and the urban innovation soft environment played an important role in supporting and promoting. At the same time, the rapid development of urban innovation and development adversely affected the urban innovation hard environment and soft environment, providing a framework for urban innovation hard environment and soft environment construction. More innovative resources support, that is, the core resources of urban innovation, the hard environment of urban innovation, the soft environment and the innovation output have an interaction relationship, thus forming a benign circular feedback system, so the core resources of urban innovation, the hard environment of urban innovation, The comprehensive consideration of soft environment and innovation output can fully reflect the level of urban innovation environment. Based on this logic, the logical thinking framework of urban innovation environment index is as follows(Figure 3):

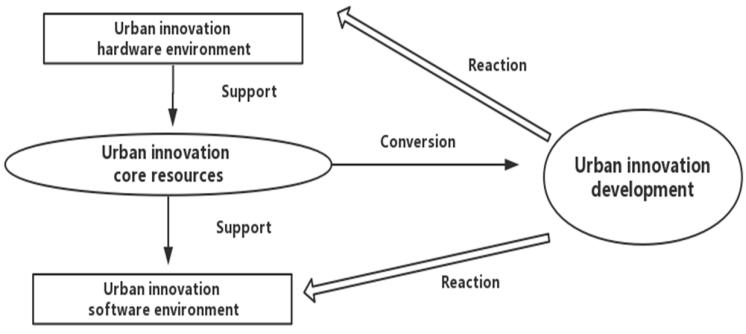

Figure 3: The construction of the innovation environment index

Based on the above-mentioned urban innovation environment index construction logic, based on the above scholars' ideas on innovative city-related research,

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according to the research and data actual situation, the index system proposed by relevant research institutes is adjusted and improved accordingly. The urban innovation environment index indicator system, including six indicators, as shown in Table 1:

Table 1 Indicators of the Innovation Environment Index

	Indicators	Indicator symbol and name	unit
Innovation Environment Index (Y)	Urban innovation hardware environment	X_1: Average number of mobile homes per 100 urban households	Ministry per Hundreds
		X_2: Fixed asset investment	Billion
	Urban innovation software environment	X_3: Internet users	Ten thousand households
		X_4: Total number of high-tech enterprises	Per home
		X_5: Household consumption level	Yuan per person
		X_6: Per capita GDP of the city	Yuan per person

(2) Data collection and processing

Relevant data comes from the Guangzhou Statistical Yearbook from 2012-2016, the Guangzhou Science and Technology Statistical Yearbook, and the Guangzhou National Economic and Social Development Statistical Bulletin.

In order to avoid the influence of dimension and magnitude on the results of regression analysis, the original data is filtered by standardization. The formula is:

$$X_i = \frac{X_i - \frac{1}{n}\sum_{i=1}^{n} X_i}{\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(X_i - \frac{1}{n}\sum_{i=1}^{n} X_i\right)^2}}$$

The data obtained by standardizing the original data according to the formula are shown in Table 2:

Table 2 Standardized data

Data / Year	X_1	X_2	X_3	X_4	X_5	X_6
2012	-0.3417	-1.4033	-0.1718	-1.2864	-1.2856	-1.4617
2013	0.4679	-0.5021	1.1233	-0.6207	-0.7088	-0.4435
2014	0.7537	0.0610	0.8644	0.1954	0.1195	0.1357
2015	0.7239	0.7295	-1.3034	0.3780	0.7465	0.6814
2016	-1.6038	1.1148	-0.5125	1.3337	1.1284	1.881

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(3) Model Establishment

The mean square error method is used to calculate the weight of each indicator. For m evaluated objects, the mean value of the j indicator is set as:

$$\bar{x}_j=\frac{1}{n}\sum_{i=1}^{n}X_{ij},(j=1、2、3\cdots6)$$

The variance value is:

$$s_j^2=\frac{1}{n-1}\sum_{i=1}^{n}\left(X_i-\frac{1}{n}\sum_{i=1}^{n}X_i\right)^2,(j=1、2、3\cdots6)$$

Then the weighting factor of the j indicator is:

$$w_j=\frac{s_j}{\sum_{j=1}^{6}s_j},(j=1、2、3\cdots6)$$

The weight coefficients calculated by the spss software are shown in Table 3:

Table 3 Weight coefficient

Data	X_1	X_2	X_3	X_4	X_5	X_6
Weight coefficient（w_j）	0.0075	0.0347	0.0042	0.0042	0.3145	0.6348

In the calculation of the innovation environment index, this paper uses a nonlinear weights model, the formula is as follows:

$$Y_i=\prod_{j=1}^{n}X_{ij}^{w_j},(X_{ij}\geq0)$$

X_{ij} is the observation value of each index after dimensionless, and w_j is the weight coefficient of each index. Therefore, the specific calculation formula for the innovation environment index is:

$$Y_i=X_1^{0.0075}\cdot X_2^{0.0347}\cdot X_3^{0.0042}\cdot X_4^{0.0042}\cdot X_5^{0.3145}\cdot X_6^{0.6348}$$

The data of the collected specific indicators are substituted into the formula, and the innovation environment index of Guangzhou 2012-2016 is calculated as shown in Table 4:

Table 4 Innovation Environment Index

Year / Index	2012	2013	2014	2015	2016
Innovation Environment Index (Y)	63806.72	71928.73	78382.84	83799.56	87537.52

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According to the analysis table, Guangzhou's innovation environment index is gradually increasing, but the growth rate is lower, and the growth rate is a downward trend. In order to more vividly represent Guangzhou's position in the global value chain, the same method is used to calculate the innovation environment of Beijing, Shanghai and Shenzhen, and draw a picture, as shown in Figure 4:

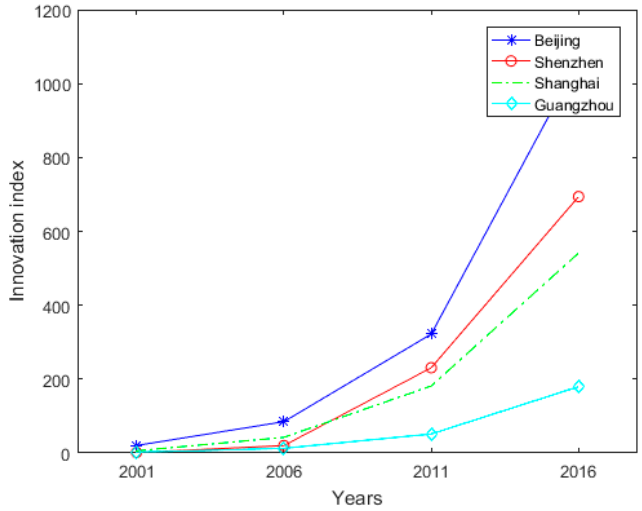

Figure 4 Comparison of the innovation environment of Beishang Guangshen

(Beijing,Shanghai,Guangzhou,Shenzhen)

It is obvious from Figure 5 that Guangzhou's innovation environment is far less than that of Beijing, Shanghai and Shenzhen in the four first-tier cities of Guangzhou, Guangzhou and Shenzhen. This result indirectly explains the reason why Guangzhou is located downstream of the value chain. If Guangzhou continues to maintain its current development trend Its economy will lag behind other cities and lose its original competitive advantage.

4. Results

Based on the analysis of the above calculation results, this paper proposes the sustainable development strategy of Guangzhou's independent innovation capability:

(1)Improve laws and policies, establish sound infrastructure, and create a good environment for innovation

In order to use innovation to drive the development of Guangzhou's economy, the Guangzhou government should establish a sound legal and policy foundation, improve public facilities, and create a good environment for R&D and innovation. Here, Guangzhou can learn from the US government's experience in dealing with Silicon Valley and set the “rules of the game”: first, establish a system that encourages innovation and entrepreneurship, such as R&D support, product procurement, and direct participation in public technology development; Establish a specialized service organization that supports R&D and innovation activities; third, establish and improve the legal system and credit system for protecting intellectual property rights; Fourth, formulate relevant taxation and subsidy policies, and promote the development and improvement of the research capital market. At the same time, infrastructure construction in Guangzhou should not be relaxed. The Silicon Valley Index released in

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2017 shows that Silicon Valley community infrastructure and services account for 52% of Silicon Valley's average annual employment, and commercial infrastructure and services account for 17%. Based on these data, the importance of infrastructure construction for innovation is evident. Therefore, Guangzhou should pay attention to the construction and improvement of relevant public facilities, and lay the foundation for creating a relatively mature innovation and entrepreneurship platform [14].

(2) Strengthening school-enterprise cooperation, developing talent market, and introducing global innovative talents

Silicon Valley has become the center of innovation in the world, and one of the key factors is the pool of talent. The talents in Silicon Valley are not only highly educated, but also international. According to statistics, non-English speakers accounted for 51% of the Silicon Valley, while the United States accounted for 21%; from 2011 to 2016, the total number of international talents flowing into Silicon Valley reached 81,000, while the outflow was only 17,000 [15]. Why can Silicon Valley absorb so many international talents? In addition to deep-level incentive systems, highly liberalized information, and good living conditions, the close ties between enterprises, universities, and research institutes are key. The Silicon Valley industrial cluster has formed a talent interoperability mechanism with universities such as Stanford University, Santa Clara University, and the University of California at Berkeley, as well as some R&D institutions. For example, Stanford University allows its faculty and staff to participate in business management without affecting their work. The former principal, John Hennessy, has served as chairman of Google's parent company, Alphabet Group. At the same time, many corporate elites will also enter. Campus professors participate in the cultivation of talents, imparting knowledge and practical experience. Therefore, drawing on the experience of the United States, Guangzhou should encourage research institutes and enterprises to carry out activities such as exchanges and talent exchanges, and transform scientific research talents concentrated in university research institutes into applied talents to promote the marketization of Guangzhou talents. Upgrade to provide innovative talents and technical talents.

(3)Highly integrated production, learning, research, and accelerate the transformation of scientific research results

The high integration of "production, learning and research" is no longer focused on bringing innovation and technology from the laboratory into the production field, but focusing on the research in the research and production fields in universities and research institutes. Create a new atmosphere in which universities and research institutes do research with production needs. This not only enables innovative technologies to be directly and efficiently translated into labor productivity, but also reduces the cost of setting up conversion costs such as intermediaries. Nowadays, the research of the American Industrialization and the research of the university are basically consistent. The needs of the American industry, such as computer science, big data research, and Internet development, have become the main source of university research. In other words, if the industry loses its needs, then many studies at American universities cannot continue. In this way, industrial production and scientific research in the United States are closely integrated, and production technology can be realized and improved in the first place. American industry has always been in a leading position in the world, and its practice of the "production, learning, research" combination mechanism proves its feasibility and practicality. This is a place worth exploring and

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learning for Guangzhou, which still regards scientific research as the main tool for honour.

(4)Develop international R&D, open innovation, and make full use of global innovation and production resources

R&D internationalization aims to promote internationalization of products, maximize the integration of resources in various regions, reduce costs, and finally achieve a global layout of R&D-production-sales. When it comes to international R&D, Shenzhen Huawei has to be mentioned. Its experience is worth learning and learning from enterprises in various regions. Since 1995, Huawei has established 16 research centers and 36 joint research and development laboratories in the United States, Japan, Russia and other countries. It is actively engaged in open innovation, using abundant resources, and promoting scientific and technological progress with the world's scientific and technological talents. Now, Huawei has become an international company with technical strength and great influence. Therefore, in order to build an international enterprise, Guangzhou should encourage enterprises to implement international research and development strategies. The following are some of the entry experiences that Huawei provides about R&D internationalization: First, adopt greenfield investment to solve technology and talent shortage, and gain experience and talent reserve before turning to R&D cooperation and cross-border M&A. Second, select a targeted entry mode based on the characteristics of the entry area. For example, in Europe, strategic cooperation and joint R&D are used for R&D investment because of the high saturation of the European market, the development of communication, and the differences in culture and religion between China and the country; and the lack of infrastructure for the land labor force. The area is entered by means of establishing a research and development center. Third, research and development should focus on market demand. Heavy technology and light market will lead to unacceptable products, which will result in waste of resources. Fourth, pay attention to patent applications and the absorption and cultivation of talents, etc. [16].

(5) Develop R&D capital market and increase R&D investment

As mentioned earlier, Guangzhou's R&D investment accounts for 2.3% of its GDP, far less than Shenzhen and Beijing, so increasing R&D investment is an urgent problem for Guangzhou. However, excessive dependence on government spending on research can lead to waste of resources or excessive use of resources. Now Guangzhou should focus on expanding non-financial inputs. At present, it is possible to establish a R&D capital market by establishing a financial technology service center and improving venture capital, so that funds can be directed from the market to innovative projects that can truly realize production value, thus achieving Pareto optimality. In the United States, the government will not directly provide a large amount of funds for innovative research and development, and will not participate in the details of the operation, but will support and legally support the legal and legal funds to help establish and improve the research capital market. In the development of Silicon Valley, nearly one-quarter of the venture capital in the United States has gradually gathered. About half of the venture capital companies and many experienced venture capitalists in the United States have concentrated on 3000 Sandsill Street. In Zhongguancun, in 2014, a financial service system covering the entire life cycle of science and technology innovation (seed, start-up, growth, maturity) was formed. At the same time, more than 500 venture capital institutions were established, which largely solved R&D. Innovative funding issues

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[17]. The use of government funds to incite funds in the entire market and establish a market for R&D funds, on the one hand, has made the source of innovative R&D expenses broad, freed from the excessive dependence of scientific research on government spending; on the other hand, it has triggered market competition, that is, only real value can be realized. Research projects can get funding and improve resource allocation efficiency.

(6) Combine the construction of Dawan District of Guangdong, Hong Kong and Macao to cultivate high-end industrial base

The Guangdong, Hong Kong and Macau Bay Area is connected to Hong Kong, Macau and Guangdong. It has a unique geographical location and a strong economic background, which has potential for development. As for how to develop, we can learn from the experience of high-tech producing areas such as Silicon Valley in the United States and Zhongguancun in Beijing – and strive to build a high-end industrial base. It is not difficult to find that the high-tech industrial bases in Beijing Zhongguancun, the US Silicon Valley and Bangalore, India have one thing in common, that is, they have formed certain industrial clusters [18]. Moreover, the major industries in these regions are developing very rapidly and occupy a leading position internationally. What is the significance of industrial clusters for the development of the industry? According to economic analysis, first, industrial clusters can produce economies of scale and reduce costs. For example, it can reduce the cost of purchasing resources and raw materials. Second, there is a knowledge spillover between enterprises in the industrial cluster, which is conducive to the exchange of knowledge and promote the balanced development of the industry. Third, the enterprises in the industrial cluster have formed The strong competition has driven the company to improve its competitiveness from innovative research and development, talent reserve and other aspects, thus launching a number of high-quality enterprises. Therefore, it is efficient to use the Guangdong, Hong Kong and Macau Bay Area as a “treasure bowl” to build a high-end industrial cluster base. If it is built into “Southern Zhongguancun”, it will contribute to the innovation and industrial upgrading of Guangzhou and even the entire Dawan District and its adjacent areas.

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