

Research on the Development and Strategy of Smart City Clusters in the Guangdong-Hong Kong-Macao Greater Bay Area

Chao Hu¹, Ding Ma^{2,*}

¹GM, Shenzhen Jiaye Technology Co.,Ltd, Shenzhen, China

²Marketing, Limkokwing University of Creative Technology, Kuala Lumpur, Malaysia

Abstract

As a new driving force for improving urban development, smart cities use information technology to create a new ecological model that is conducive to the emergence of innovation, and to open up and integrate urban systems and services to improve the efficiency of resource operation. Smart cities need to continue to optimize urban management and services, move quickly into the smart era, and improve the quality of urban life. The Guangdong-Hong Kong-Macao Greater Bay Area is one of China's earliest regions to open up, and its export-oriented economy has significant characteristics. The Guangdong-Hong Kong-Macao Greater Bay Area has formed a relatively complete industrial system, but these industries have obvious homogeneity. The regional economy is prone to collective shocks in trade frictions, which has led to the export of cities in the Greater Bay Area. The growth rate has declined to varying degrees. In addition to poor industrial synergy, the industries in the Guangdong-Hong Kong-Macao Greater Bay Area also have obvious "shortcomings" such as insufficient core competitiveness and low added value.

Keywords

Guangdong-Hong Kong-Macao Greater Bay Area; Smart cities; Urban clusters; Urban development.

1. Introduction

The concept of smart cities originated from the "New Urbanism" and "Smart Growth" movements in the 1990s, with the purpose of solving many problems caused by urban sprawl. In 2008, the smart city was first proposed by IBM. The construction of a smart city is a profound change. It not only integrates new-generation information technologies such as cloud computing, Internet of Things, big data, and geographic information, but also a comprehensive knowledge about urban health and smart development. At the same time, smart cities will also promote the transformation of urban management methods, making the public the real core of driving urban development, promoting the diversification and flatness of urban management methods, promoting the transformation of government intelligence to a service-oriented direction, and continuously improving the access of the people. Sense, happiness and security.

2. The status quo of urban clusters in the Guangdong-Hong Kong-Macao Greater Bay Area

2.1. Section Headings

2.1.1. Sub-section Headings

The Guangdong-Hong Kong-Macao Greater Bay Area has a population of more than 70 million, GDP accounts for more than 10% of the country, has three mega international cities in Guangzhou, Hong Kong and Shenzhen, and has a complete economic system covering

manufacturing, financial services, technology, and trade. It has connections with Tokyo Bay Area and New York. Competitive development potential in the Bay Area and the San Francisco Bay Area. The Thirteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China clearly proposes the development of the Guangdong-Hong Kong-Macao Greater Bay Area and the strategic requirements for the international bay area to be my country's largest bay area. "Clearly put forward the development goal of building my country's first smart city cluster, and the establishment of a smart city cluster in the Guangdong-Hong Kong-Macao Greater Bay Area is of benchmarking significance for the construction of other smart city clusters in China. [1]

With regard to the construction of the Guangdong-Hong Kong-Macao Greater Bay Area, different cities have different understandings of the overall development and construction of the Guangdong-Hong Kong-Macao Greater Bay Area, and their development demands are also different. For example, Shenzhen, which is adjacent to Hong Kong, focuses on the integration of Shenzhen and Hong Kong, and promotes the full integration of Shenzhen and Hong Kong's financial services with professional services. While Guangzhou focuses on industrial production, foreign trade and logistics, and is relatively lagging behind in the tertiary industry. Cities like Jiangmen, Zhongshan, and Zhaoqing are not very clear about their own development positioning, and their participation in the Guangdong-Hong Kong-Macao Greater Bay Area is relatively low. They are usually attached to the construction of nearby metropolitan areas and fail to give full play to their own advantages.

The construction of the Guangdong-Hong Kong-Macao Greater Bay Area proposes to use technology as the main driving force for development and rely on talents, industries, policies and other resources to achieve economic booming. It means that more labor force, information data, and policy services will be gathered in the Bay Area city clusters. It is necessary to use information and communication technology to sense, analyze, and integrate various key information of the core system of urban operation, and use big data and advanced technology. The realization of the intelligent management and operation of the city by communication technology poses new requirements and challenges. The government's vigorous promotion of the construction of smart city clusters in the Guangdong-Hong Kong-Macao Greater Bay Area is not only an inevitable requirement for the construction of the Guangdong-Hong Kong-Macao Greater Bay Area in the 13th Five-Year Plan, but also the realization of the grand blueprint for the 100th anniversary of the founding of New China and the great rejuvenation of the Chinese nation. The only way to China's Chinese dream. A comprehensive understanding of the strategic significance of establishing a cluster of smart cities in Guangdong, Hong Kong and Macau. It is conducive to accelerating the integration of Hong Kong and Macao into the economic circle of the Guangdong-Hong Kong-Macao Greater Bay Area, organically participating in the historical process of China's economic vigorous development, and enhancing the centripetal force of Hong Kong and Macao compatriots towards the motherland. At the same time, it is also conducive to strengthening cooperation with the world's important cities and bay areas in the direction of development concepts, and has a certain positive significance for the construction of a community with a shared future for mankind under the background of globalization. [3]

3. Theory of Smart City Cluster Development

In the field of smart city research, European and American countries started earlier. Urban economics researchers Hollands RG, Vanolo A., Kitchin, R., Hall, RE, Bowerman B., Braverman J., Taylor J., Todosow H., & Von Wimmersperg U both put forward the concept of smart city research at the beginning of the 21st century, laying the cornerstone of smart city research. In the past ten years, research on smart cities in the world has generally heated up, and the research focus has been shifted from theoretical frameworks to case studies and strategic

studies. Researchers such as Bakıcı, T., Almirall, E., & Wareham, J. Paskaleva, KA, etc. have all published The results of case studies are presented. Among them, the research results of Caragliu, A., Del Bo, C., & Nijkamp, P. on European cities are the most influential in academia. Among the latest results published in the past five years, academic research focuses on the field of scientific and technological innovation, focusing on analyzing the interaction between technology and smart city concepts represented by big data. Representative researchers include Jin, J., Gubbi, J., Marusic, S., & Palaniswami, M., Batty, M. etc.[2]

China's research on smart cities started ten years ago and developed rapidly on the basis of research concepts established abroad, focusing on the feasibility study of my country's policies for building smart cities; in recent years, in the context of the development of big data, smart city research Combined with big data research, a large number of influential research results have emerged. At the same time, many first- and second-tier cities have established the development direction of smart cities, and a large number of thoughts on the development direction of smart cities have also appeared in the academic circle.

At present, the smart city cases that can be used as reference include smart Shanghai, smart Nanjing, smart Wuhan and Singapore's "Smart Nation Project" relying on big data in China, the "U-City Project" of South Korea, and the "Smart Barcelona" of Spain. case study. However, these studies focus on mega-cities on the one hand, and the research on small and medium-sized cities is relatively weak. On the other hand, existing smart city research tends to focus on one city, ignoring the role of inter-city collaboration and regional economic integration. Compared with the case of focusing on one city, research focusing on regional economic integration and the construction of smart city clusters is particularly scarce. Although the influence of existing foreign smart city cluster research is not as strong as that of single smart city research, it has shown a trend of rapid development and has stimulated a large number of academic discussions within a short period of publication. Representative academic achievements include foreign Gupta K., Hall R. P.'s research on Indian smart city clusters., Fernandez-Anez V, Fernández-Güell J M, Giffinger R.'s research on Vienna's smart city clusters. Most of the relevant domestic research results have been published in the past five years, but the overall citations of these studies are relatively low, such as Chen Bo "China Smart City Cluster System Architecture, Construction Strategy and Path Research", Li Bing, Chen Fuxing "Based on Factor and Cluster Analysis" Analysis on the Integration Path of Beijing-Tianjin-Hebei Smart City Clusters, as well as cutting-edge smart city cluster research published in the past two years, such as Wu Yanru's "Xia Zhangquan "Smart City Cluster" Construction Mode Research", etc.

Research on the construction of smart city clusters must take into account the big data background. Foreign researches on big data and urban construction have emerged in large numbers after 2010, and they have a strong influence. Representative researchers include Batty, M., Kitchin, R., Rathore, M. M., Ahmad, A., Paul, A., Rho, S., etc. These studies focused on studying the role of big data in promoting the development of smart cities, and pointed out the strategic decisive role of big data technology in the comprehensive construction of smart cities with smooth information exchange, effective information sensing and analysis, and organic integration of urban resources. However, some of these studies focus on the overview of smart city construction under the macro-big data environment, and are lacking in empirical analysis. Some studies are completely based on foreign big data and smart city construction, and lack an understanding of big data and smart city cluster construction in the context of China. Their research results have little significance for the construction of smart city clusters in the context of China's big data. This research will fully base on the role of big data development in the construction of smart city clusters in the Guangdong-Hong Kong-Macao Greater Bay Area in the context of China, fully explore the international experience that can be used for reference, and propose the feasibility and localization of big data development for the construction of smart city clusters.

4. Flywheel Development Theory of Smart City Clusters

With the development of economic globalization and regional integration, competition between countries and regions is increasingly concentrated in competition between cities, especially between large cities and megacities with a certain international influence. [4] The dense urban area represented by the organizational form of urban agglomerations has become a huge influence space that gathers domestic and even international economic and social elements, such as the northeastern coast of the United States, the coast of the Great Lakes, the Tokaido area of Japan, and the area extending northwest from the southeast as the center of the United Kingdom. The large urban agglomerations in northwestern Europe centered on Amsterdam, Paris and Ruhr are considered to be the most mature world-class urban agglomerations.

Take the Tokyo Bay Area as an example:

In terms of geography, the concept we commonly call "Tokyo" includes the following five different geographic areas:

- ① In the heart of Tokyo, the three main districts in the central area of Tokyo are Chiyoda, Chuo and Minato. The area is only 42.16 square kilometers.
- ② The Tokyo Metropolitan Area, commonly known as the 23 wards of Tokyo, is equivalent to the 35 wards under the jurisdiction of the city of Tokyo in the past, and is also generally referred to as "Tokyo"; the area is 621.83 square kilometers.
- ③ Tokyo includes 23 special districts, 26 cities, 5 towns and 8 villages. The area is 2187.50 square kilometers.
- ④ Tokyo area (Tokyo Metropolitan Area) includes the "one metropolis and three prefectures" of Tokyo, Saitama, Chiba and Kanagawa prefectures; the area is 13,558.19 square kilometers.
- ⑤ The metropolitan area includes the "one capital and three prefectures" and its surrounding Ibaraki, Tochigi, Gunma and Yamanashi prefectures, collectively referred to as the "one capital and seven prefectures"; the area is 36889.89 square kilometers.

The Tokyo Bay Area relies on the development of Tokyo Bay, with ports such as Yokohama Port, Tokyo Port, Chiba Port, Kawasaki Port, Yokosuka Port and Kisarazu Port. Together with the two major international airports of Haneda and Narita and the Shinkansen, these ports constitute a three-dimensional transportation network between Tokyo Bay and major cities in Japan and the world.

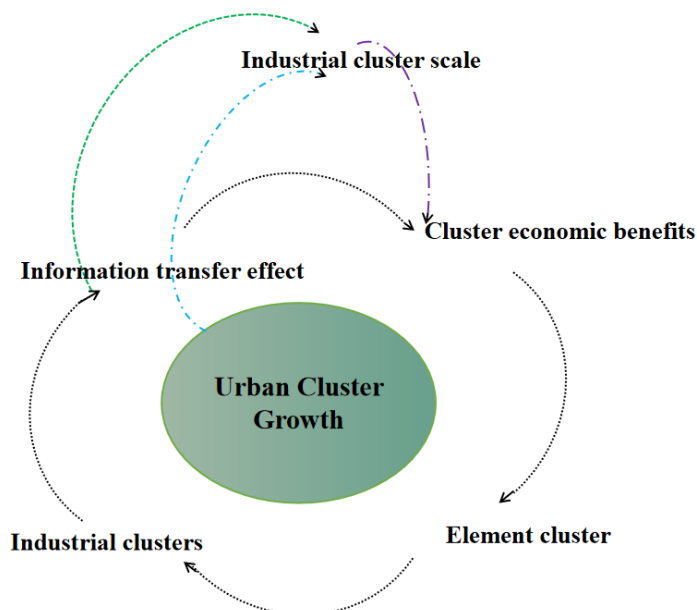


Figure 1. Smart city cluster flywheel development theory

The "Smart City Cluster Flywheel Development Theory" is a closed loop that can start from any city but has no end of development. With sufficient economic volume in urban clusters, the economic development of urban clusters will produce scale effects. The addition of new cities brings new development opportunities and at the same time alleviates the shortage of urban development talents. [5] The industrial scale of urban clusters has also been further improved. This has formed a virtuous circle.

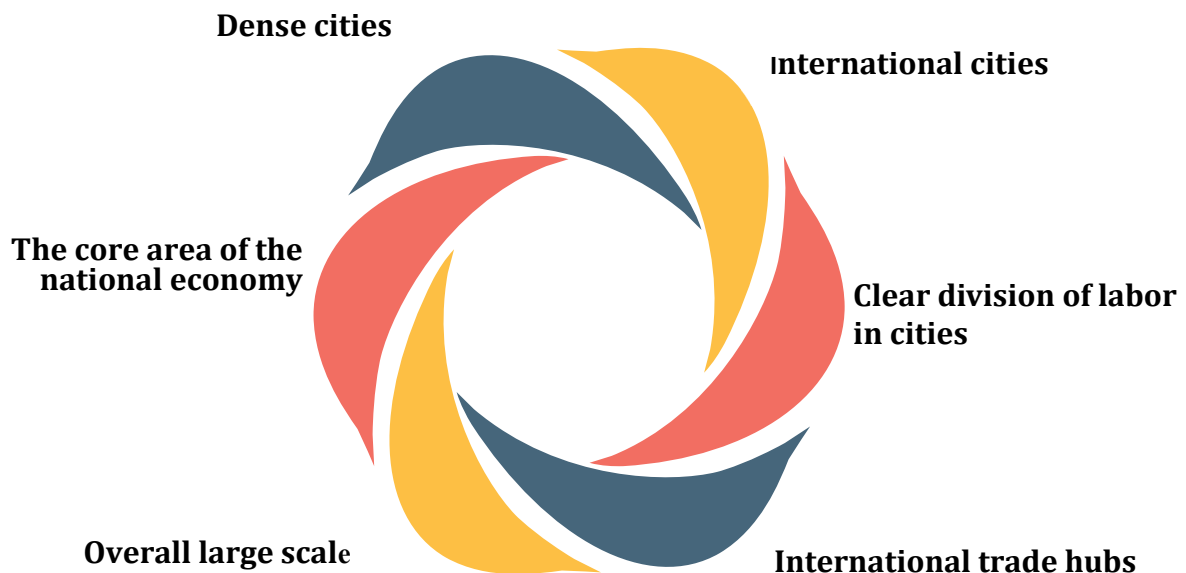


Figure 2. Flywheel development conditions for smart city clusters

Flywheel development of smart city clusters should meet the following conditions:

- (1) There are dense cities in the smart city cluster area.
- (2) The smart city cluster has one or several international cities.
- (3) Multiple cities have clear division of labor and close social and economic ties with each other, forming an organic whole and possessing overall advantages.
- (4) Smart city clusters need to have one or several international trade transit ports, international airports, and information ports as the hubs for the city cluster's external connections. [6] At the same time, the region has developed and convenient transportation facilities composed of highways, high-speed railways and other modern transportation facilities. This transportation network is the supporting system for the huge social and economic connections within and outside the smart city cluster.
- (5) The overall scale of the smart city cluster, with an urban population of at least 25 million.
- (6) The smart city cluster area is the core area of the national economy. For example, Japan's Pacific Rim city cluster has a population of less than one-seventh of the country and 58% of its output.

5. The Development Model of Smart City Clusters in the Guangdong-Hong Kong-Macao Greater Bay Area

According to the "Outline of the Reform and Development Plan for the Pearl River Delta Region (2008-2020)" released in January 2009, the Pearl River Delta urban agglomeration is positioned as a pilot area for exploring scientific development models and a pioneering area for deepening reforms. An important international gateway for the expansion of the Pearl River Delta, adhere to the "One Country, Two Systems" policy, promote close cooperation and

integrated development with Hong Kong and Macao, and jointly create the most dynamic and internationally competitive city cluster in the Asia-Pacific region, the world's advanced manufacturing and modern service industry base. [7]

The Guangdong-Hong Kong-Macao Greater Bay Area is located in southern China. It was formerly known as the Pearl River Delta City Group. It is the region with the most dynamic economy and the highest urbanization rate among the Chinese city groups. The Guangdong-Hong Kong-Macao Greater Bay Area is one of the most dynamic economic zones in China and even the Asia-Pacific region. It includes Hong Kong, Macau, Guangzhou, Shenzhen, Foshan, Dongguan, Zhongshan, Zhuhai, Jiangmen, Zhaoqing, Huizhou and other cities. The total land area is 55,000 square kilometers, accounting for 0.6% of China. [8] The total economy in 2018 was 8.1 trillion yuan, accounting for 9.0% of China; the permanent population was about 60 million, accounting for 4.5% of China, and the average annual population growth rate in the past three years was as high as 2.4%; the market value of A+H-share listed companies was 154,000 100 million yuan, accounting for 20.1% of China's; GDP per capita reached 129,000 CNY.

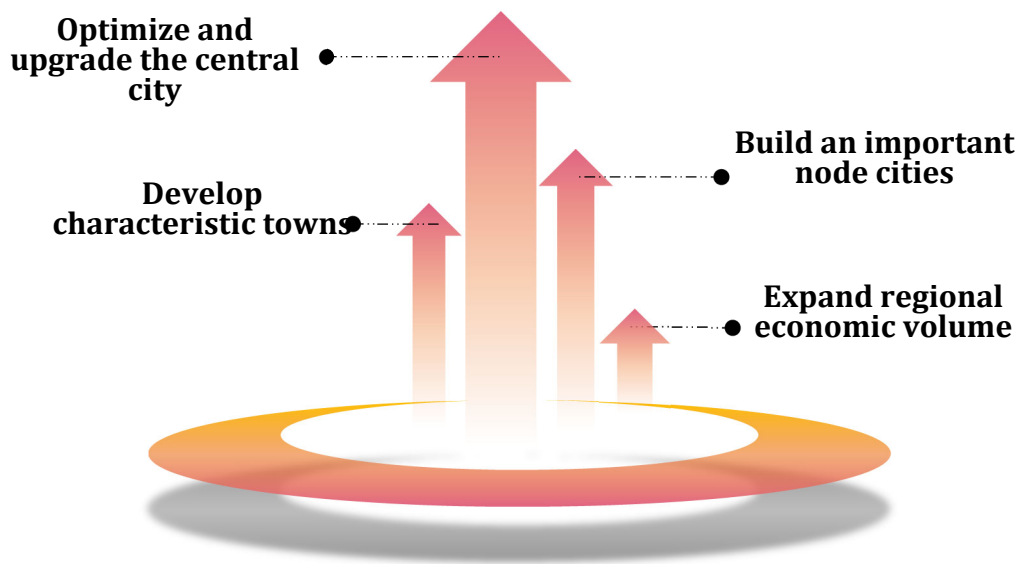


Figure 3. Guangdong-Hong Kong-Macao Greater Bay Area Smart City Cluster Development Model

5.1. Optimize and Upgrade the Central City

The Guangdong-Hong Kong-Macao Greater Bay Area should take Hong Kong, Macau, Shenzhen, and Guangzhou as the development centers and main driving forces to promote the economic development of the surrounding areas of the Guangdong-Hong Kong-Macao Greater Bay Area. The Guangdong-Hong Kong-Macao Greater Bay Area also needs to actively leverage Shenzhen's technological advantages, Guangzhou's economic advantages, Hong Kong's international financial advantages, and Macau's advantages in tourism and entertainment to fully promote the development of industrial belts in Foshan, Zhongshan and other regions. [9]

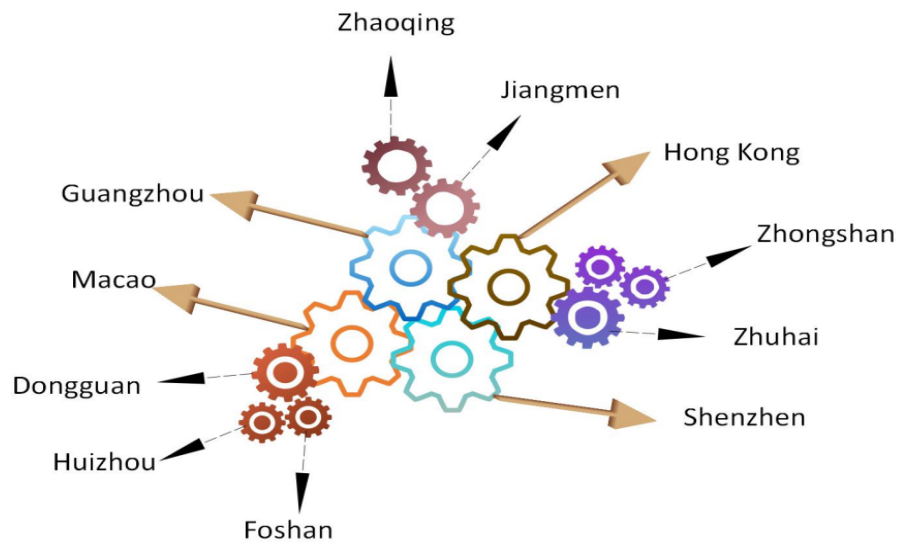


Figure 4. Guangdong-Hong Kong-Macao Greater Bay Area Smart City Cluster Core Engine Model

5.2. Build An Important Node Cities

The Guangdong-Hong Kong-Macao Greater Bay Area supports Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen, Zhaoqing and other cities to give full play to their own advantages, deepen reform and innovation, and enhance the overall strength of the city, forming distinctive features and complementary functions. An important node city with competitiveness. [10] The Guangdong-Hong Kong-Macao Greater Bay Area strengthens the coordination of development, strengthens interaction and cooperation with central cities, and promotes the development of surrounding characteristic towns, and jointly improves the development quality of urban agglomerations.

5.3. Develop Characteristic Towns.

The Guangdong-Hong Kong-Macao Greater Bay Area takes full advantage of the large number and large volume of characteristic towns in the nine Pearl River Delta cities, cultivates a number of charming towns with distinctive advantages, improves municipal infrastructure and public service facilities, and develops characteristic industries, Inherit traditional culture and form an important support for optimizing the pattern of regional development. The Guangdong-Hong Kong-Macao Greater Bay Area will build smart towns, carry out smart technology application trials, promote institutional innovations, and explore future urban development models. The Guangdong-Hong Kong-Macao Greater Bay Area is accelerating the reform of the administrative management system of mega-towns, and continuously expanding the functions of mega-towns on the basis of reducing administrative costs and improving administrative efficiency. [11]

5.4. Expand Regional Economic Volume

Due to the small spatial scale of the Guangdong-Hong Kong-Macao Greater Bay Area, the space between towns is close to each other, and the urban agglomeration has the characteristics of strong multi-core connections. In 2020, the total GDP of the Guangdong-Hong Kong-Macao Greater Bay Area will be 8952.393 billion yuan, accounting for about 8.8% of the country's total GDP. In 2020, there will be a total of 3 cities in the Guangdong-Hong Kong-Macao Greater Bay Area with GDP exceeding 1 trillion yuan. They are Shenzhen 2,670.024 billion yuan, Guangzhou 2,501.911 billion yuan, and Foshan 1081.647 billion yuan. The proportion of the amount is as high as 71%. [11] It can be seen that Guangzhou, Shenzhen, and Foshan are very important in the economic status of the Pearl River Delta.

6. Development Direction of Smart City Clusters in the Guangdong-Hong Kong-Macao Greater Bay Area

6.1. Qualitative and Quantitative Analysis of the Necessity and Comprehensive Benefits of Smart City Construction

The construction of smart cities is based on the needs of urban economic and social development, and is the inevitable result of the development of the city to a certain extent. The comprehensive benefits it produces include macro-social benefits in addition to its own micro-economic benefits. However, the combined evaluation method is a comprehensive analysis based on the evaluation and analysis of individual indicators, which overcomes the shortcomings of the first two methods. However, in the comprehensive evaluation problem, there is usually a certain degree of ambiguity. [12] Especially for the social benefits of smart cities, most of the indicators cannot be quantified. To deal with the comprehensive evaluation of smart city construction and comprehensive benefits, the mathematical method of applying multiple linear regression is the most appropriate.

Multiple linear regression model of smart city construction and comprehensive benefits:

$$y_t = \beta_0 + \beta_1 x_{t1} + \beta_2 x_{t2} + \dots + \beta_{k-1} x_{t(k-1)} + u_t$$

Where y_t is the explained variable (dependent variable), x_{tj} is the explanatory variable (independent variable), u_t is the random error term, β_i , $i = 0, 1, \dots, k-1$ is the regression parameter.

The practical significance of urban economic development: y_t and x_{tj} have a linear relationship, x_{tj} , $j = 0, 1, \dots, k-1$, is an important explanatory variable for y_t . u_t represents many small factors that affect the change of y_t .

When a sample of regional economy ($y_t, x_{t1}, x_{t2}, \dots, x_{t(k-1)}$) is given, $t = 1, 2, \dots, T$, the above model is expressed as:

$$\begin{cases} y_1 = \beta_0 + \beta_1 x_{11} + \beta_2 x_{12} + \dots + \beta_{k-1} x_{1(k-1)} + u_1, \\ y_2 = \beta_0 + \beta_1 x_{21} + \beta_2 x_{22} + \dots + \beta_{k-1} x_{2(k-1)} + u_2, \\ \dots\dots\dots \\ y_T = \beta_0 + \beta_1 x_{T1} + \beta_2 x_{T2} + \dots + \beta_{k-1} x_{T(k-1)} + u_T \end{cases}$$

Economic significance: x_{tj} is an important explanatory variable of y_t .

For multiple regression models, when the dimensions of the explanatory variables are not the same, the estimated regression coefficients cannot be compared. To compare the relative importance of explanatory variables in a multiple regression model, the regression coefficients should be transformed as follows:

$$\hat{\beta}_j^* = \hat{\beta}_j \frac{s(x_{tj})}{s(y_t)}, \quad j = 1, 2, \dots, k-1$$

Where $s(x_t)$ and $s(y_t)$ represent the sample standard deviations of x_t and y_t , respectively. $\hat{\beta}_j^*$ can be used to compare sizes directly.

Taking the binary model as an example, the standardized regression model is expressed as follows,

$$\frac{y_t - \bar{y}}{s(y_t)} = 1 * \frac{x_{t1} - \bar{x}_1}{s(x_{t1})} + 2 * \frac{x_{t2} - \bar{x}_2}{s(x_{t2})} + \dots + u_t$$

Multiply $s(y_t)$ on both sides, which is

$$(y_t - \bar{y}) = 1 * \frac{s(y_t)}{s(x_{t1})} (x_{t1} - \bar{x}_1) + 2 * \frac{s(y_t)}{s(x_{t2})} (x_{t2} - \bar{x}_2) + \dots + u_t s(y_t)$$

Because the mean point must be on the regression line, remove the equation formed by the mean point in the above formula, then there must be

$$y_t = 1 * \frac{s(y_t)}{s(x_{t1})} x_{t1} + 2 * \frac{s(y_t)}{s(x_{t2})} x_{t2} + \dots + u_t s(y_t)$$

and so,

$$j * \frac{s(y_t)}{s(x_{ij})} = j, \quad i = 1, 2, \dots, k-1, \quad i s_j * = j \frac{s(x_{ij})}{s(y_t)}, \quad i = 1, 2, \dots, k-1$$

The comprehensive economic benefits of smart cities continue to develop in a dynamic and unbalanced state. Although the external environment is constantly changing, it has little impact on the construction and development of smart cities.

6.2. The Regional Economic Development of the Guangdong-Hong Kong-Macao Greater Bay Area Continues to Expand Abroad

After the local economy of Hong Kong and Macao has developed to a certain extent, due to geographical restrictions, the room for expansion is also limited. In addition, after the cities of Hong Kong, Shenzhen, Guangzhou and Macao have developed to a certain extent, due to dense population, traffic congestion, serious pollution, excess capital, and relative shortage of natural resources, their production costs have risen, and their external economic benefits have gradually decreased, thereby weakening the momentum of economic growth. At this time, the further expansion of urban production scale in Shenzhen, Hong Kong, Macao, and Guangzhou will become uneconomical, and capital, labor, and technology will naturally spread to the backward areas. [13] This urban proliferation effect contributes to the development of surrounding urban areas.

6.3. The Master Control Standard and Evaluation System of Smart Cities in the Guangdong-Hong Kong-Macao Greater Bay Area

The evaluation criteria are based on clarifying the connotation of smart cities, combined with the current status of China's smart city construction and existing problems, to determine the range of indicators for smart city evaluation. The development level of smart cities in the Guangdong-Hong Kong-Macao Greater Bay Area is examined from three aspects: the preparation of smart cities in the Guangdong-Hong Kong-Macao Greater Bay Area, the management capabilities of smart cities, and the service level of smart cities. The construction of the evaluation index system is a process of continuous integration of theory and practice, through theoretical research to guide practice, and continuous verification and improvement in practice. The design of the evaluation index system for smart cities in the Guangdong-Hong Kong-Macao Greater Bay Area must first clarify the scope of the indicators, select indicators that reflect the current level of China's smart city construction and development, and then

select appropriate samples for trial evaluation, and test and verify the preliminary calculation results. The evaluation index system makes necessary adjustments and amendments to the index system based on the verification results, and finally establishes an evaluation index system suitable for China's national conditions and the characteristics of the current development stage of smart cities in the Guangdong-Hong Kong-Macao Greater Bay Area.[14]

6.4. Talents and Development in the Guangdong-Hong Kong-Macao Greater Bay Area

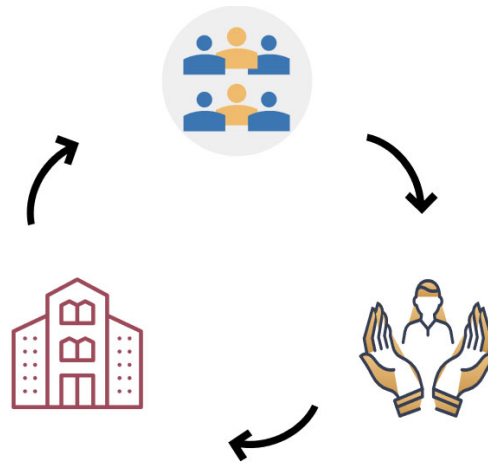


Figure 5. Talents and Development in the Guangdong-Hong Kong-Macao Greater Bay Area

Talent is the most important factor of production and the main body of innovation. The Guangdong-Hong Kong-Macao Greater Bay Area should take the construction of a world-class talent gathering highland as the first strategy for the development of China's urban agglomerations, so that talents can "attract", "strengthen" and "retain". First, the Guangdong-Hong Kong-Macao Greater Bay Area should be based on the positioning of functional zones, attract talents through planning, industries, and markets, avoid vicious competition among cities for talent introduction, and realize the optimal allocation of talents of different types and levels. [15] The second is the Guangdong-Hong Kong-Macao Greater Bay Area to strengthen the construction of various innovative and entrepreneurial service platforms, intellectual property trading platforms and other service platform facilities, to create an environment conducive to innovation and entrepreneurship, so that talents can "strengthen" and make their technology and knowledge "usable". The third is to strengthen the supply of public products in the Guangdong-Hong Kong-Macao Greater Bay Area and promote the equalization of basic public services. The government has accelerated the reform of the household registration system, vigorously promoted the construction of public rental housing and low-rent housing, and reduced the housing cost of new citizens. The government reforms the administrative examination and approval system, promotes the experience of "no-face approval" and "maximum run once" for tax matters, lowers entry barriers, and allows all kinds of talents to be "retained", which has become the first element in the development of urban agglomerations. [16].

7. Conclusion

In terms of the geographic scope of the Guangdong-Hong Kong-Macao Greater Bay Area, the Guangdong-Hong Kong-Macao Greater Bay Area is an urban agglomeration that "connects first and then interacts". With the increasing core role of the central cities of Guangzhou and Shenzhen, a strong core development driving force is a necessary condition for the formation of a metropolitan area, and the natural environment has an impact on the formation of the

metropolitan area. However, the Guangdong-Hong Kong-Macao Greater Bay Area is a smart city cluster with multiple cores and strong connections under the joint action of Hong Kong, Macao, Guangzhou and Shenzhen. Therefore, under the strong connection and multi-core urban agglomeration, how can the government organize regional resources more reasonably, promote the efficient development of metropolitan areas, coordinate the relationship between adjacent metropolitan areas, and enhance the overall competitiveness of the region. This is an issue that needs to be further explored in the Pearl River Delta and similar regions.

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