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Application and Development of Smart City in Guangdong, Hong Kong and Macao Greater Bay Area

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Abstract: With the acceleration of the global urbanization process, all countries and regions pay more and more attention to the sustainable development of cities. As of October 2021, 132 countries and regions have upgraded the goal of "carbon peak and carbon neutral" to a national strategy, and have proposed a vision of a zero-carbon future. The construction of a smart city has become an important factor in sustainable urban development. The special geographical location of Guangdong Hong Kong and Macao Greater Bay Area (hereinafter referred to as GBA) determines its development flexibility, and this region is bound to become one of the important development strategic regions in China. This paper selects the three core cities of GBA, Hong Kong, Guangzhou, and Shenzhen, as the research objectives, and to integrate, compare, and analyze the achievements of these cities in terms of smart cities. The research results can provide a reference for the construction direction of smart cities in other cities.

Keywords: Smart city, Guangdong Hong Kong Macao Greater Bay Area, City Management

1. Introduction

There are many successful cities in the world. These cities have made high achievements in the fields of economy, politics, culture and so on. They have set an example for other cities and promoted the development of the world. As the forefront of China's reform and opening up, Guangdong Hong Kong Macao Greater Bay (hereinafter referred to as GBA) has played a significant role in China's economic growth. The economic aggregate of GBA is expected to reach 250million US dollars in 2025, and there is great hope to surpass the Tokyo Bay area and become the world's largest Bay area economy. Due to its unique geographical location, GBA has shown a high degree of flexibility potential in economic development. The strategic position of this region is not only of great significance to China's domestic economy but also has an impact on the global economic pattern. Therefore, it has been identified as one of the important development strategic regions of the country. Hong Kong, Guangzhou, and Shenzhen, as the core cities of GBA, and even the core cities of China, have made high achievements in the development of smart cities. According to the list of top 100 cities with comprehensive influence on the construction and development of new smart cities in China in 2021-2022, Hong Kong, Guangzhou and Shenzhen are all in the top ten, ranking second, third and fourth respectively, which proves that the development of smart cities in Guangdong, Hong Kong and Macao is in a leading position in China. At the same time, as a regional urban agglomeration with the most solid and dynamic foundation for China's economic development, the

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construction of a smart city undoubtedly provides a strategic opportunity for the development of GBA. With digital transformation as an important driving force, This undoubtedly has significant practical significance and urgency to build a world-class regional community with sustainable development on the basis of high standards through smart enabled regional collaborative development, and make it a benchmark and vanguard model for the construction of new smart cities in China [1]. The Chinese government attaches great importance to the construction of GBA. In 2022, the administrative regulations on the development of digital economy in Guangdong, Hong Kong and Macao formulated by the State Council, the "State Council on printing and distributing the comprehensive overall plan for deepening the world-oriented development of Guangdong, Hong Kong and Macao in Nansha, Guangzhou", mentioned that the development goal of GBA is to "create an 'intelligent manufacturing + intelligent service' industry chain. Accelerating the development of the digital industry is conducive to promoting the establishment of the next-generation National Internet Engineering Innovation Center in Guangdong, Hong Kong, and Macao Greater Bay District, and promoting the development of industry application demonstration of Internet Protocol version 6 (IPv6) and next generation Internet computing services [2]. However, due to the institutional barriers and unbalanced economic development in bay cities, there is no comprehensive and feasible development idea on how to realize the coordinated development of the cities in the bay area [1]. This paper will integrate the development of smart cities in Hong Kong, Guangzhou and Shenzhen, and make a comparison and analysis. The research results are available for reference and inspiration for smart cities construction in other cities.

2. Comparison and Analysis of Smart Cities in GBA

2.1. Hong Kong

2.1.1. Status

Hong Kong is one of the most densely populated cities in the world, with a population of more than 7million living on 1100 square kilometers of land. The whole city has many mountains, and the land area for real estate development is extremely limited, so high-intensity land development cannot be avoided [3]. Scarce land resources and high housing prices make Hong Kong one of the cities with the highest housing prices in the world. A large number of Hong Kong residents can not afford housing, and the supply of housing can not keep up with the population growth. At the same time, with the development of population and cities, the traffic pressure will be increasing, especially during peak periods. In addition, with the continuous improvement of the city rate in Hong Kong, environmental problems have become increasingly prominent. As Hong Kong is an island city, environmental remediation will be very difficult, which has a serious impact on the environmental quality of Hong Kong.

2.1.2. Solution

The evolution of smart city in Hong Kong can go back to 1998, when the Hong Kong government announced the "Digital 21" technology strategy. Then in 2017, the SAR government announced the Hong Kong Smart City blueprint, and then in 2020, the SAR government issued the upgraded Hong Kong Smart City blueprint 2.0 [1]. Hong Kong's urban development plan has been constantly updated, and the city's development has gone through the evolution from a digital city to an e-commerce society and then to a smart city. At present, Hong Kong has ranked among the top 20 smart cities in the world [1]. The smart construction of Hong Kong city mainly covers six major areas, including travel, life, environment, citizens, government and economy [1]. In terms of smart travel, smart travel system and friendly travel environment will be formed by building intelligent transportation system

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and transportation system [1]. In terms of smart life, we will implement the "WiFi connected city" plan, promote the "fast revolution" mobile payment system and the "smart and convenient" personalized service platform, and widely realize digitization in the aspects of pension, sports and culture, so that citizens can enjoy smart life services more deeply [1]. In terms of smart environment, promote various carbon reduction measures, develop green buildings, and apply new technologies to strengthen environmental health management, so as to form a more intelligent urban system [1]. In terms of smart citizens, we will focus on Strengthening Young Stem innovation education, promoting the cultivation of scientific and technological professionals and the development of scientific and technological innovation enterprises, and cultivating talents of the new era [1]. In the light of smart government, the Hong Kong government has launched a spatial data sharing platform and a visual 3D map for free use by the public, so that the public can enjoy more convenient and efficient digital public services [1]. In terms of smart economy, Hong Kong has taken a number of scientific and technological innovation measures to strengthen Hong Kong's economic pillars such as financial technology and smart tourism, promote the digital transformation of Commerce, and make Hong Kong a scientific and technological innovation hub with international influence [1]. Hong Kong has adopted a government led, public-private partnership model in the construction of smart cities. The government plays a crucial role and has made great contributions in coordinating resources and promoting Hong Kong's digital infrastructure [1].

2.1.3. Future development

Building a smart city provides a new idea for Hong Kong's current development bottleneck. The vision of Hong Kong's smart city development in the new era is to "embrace science and innovation and build a smart Hong Kong with world-famous, vigorous economy and high-quality life". The new blueprint of Hong Kong's smart city is described by taking the needs of citizens as the guide, smart infrastructure as the support, and technological innovation as the application [1].

2.2. Guangzhou

2.2.1. Status

The developed economy of Guangzhou has attracted a large number of immigrants, resulting in the characteristics of large population mobility. The difference between the registered population and the permanent population is very serious. At the same time, the building density of some old residential areas in Guangzhou is too high to meet the needs of greening, residents' leisure and entertainment, while the building height of new residential buildings is often too high for higher economic benefits, affecting the surrounding ventilation and sunshine. In addition, the comprehensive intensity of regional high-temperature events since June 13, 2022 has reached the strongest level since the complete meteorological observation records, according to the "perspective of extreme high temperatures to explore countermeasures" issued by the China Meteorological Administration on August 30, 2022. As one of the subtropical high-density cities, Guangzhou is facing a very serious problem of urban high temperature [4].

2.2.2. Solution

In 2012, Guangzhou issued the implementation opinions on building a smart Guangzhou, put forward the development goals and "tree" framework of smart city construction, began to implement the "smart Guangzhou" development strategy, and steadily realized the evolution and iteration of smart city construction. In 2021, the Guangzhou municipal government issued a work plan for Guangzhou to further accelerate the construction of a smart city and comprehensively promote digital

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development, proposing to build a smart city in Guangzhou with high standards that integrates digital government, digital economy and digital society, and build a digital economy leading city, an international first-class smart city, and an international information hub city [1]. At present, Guangzhou is constantly optimizing the functions of smart applications, focusing on improving the digital service level in the field of people's livelihood, and comprehensively improving the intelligence and refinement of urban management, and has made phased achievements.

2.2.3. Future Development

As the core city and National Central City in GBA, Guangzhou has obvious technological and industrial advantages in developing the digital economy, and the current situation shows a rich and diverse development ecology [5]. The smart city construction in Guangzhou will be developed in a data-based and technology innovation driven mode. Guangzhou's total economic development is stable and still has strong urban competitiveness. It is believed that the construction of a smart city will bring a higher quality of life to Guangzhou's citizens and bring new vitality to Guangzhou.

2.3. Shenzhen

2.3.1. Status

Shenzhen has the highest population density in China. The city is facing natural disasters such as earthquakes, typhoons, rainstorms and other emergencies such as large-scale infectious diseases. Shenzhen urgently needs to make up for and improve the construction of urban emergency response capacity [6]. For traffic, the traffic congestion problem in Shenzhen is manifested in the contradiction between the limited road capacity and the growth of vehicles. For land resources, the shortage of land resources in Shenzhen is reflected in the contradiction between insufficient land supply and land demand. Moreover, the water quality of some rivers in Shenzhen has been rated as inferior to grade V, and there are still problems in water resources protection. In addition, 8079 tons of garbage are transported to surrounding cities in Shenzhen for treatment, which faces great pressure in garbage treatment.

2.3.2. Solution

As a special economic region, a national economic center city and a national innovative city, Shenzhen has an early layout of smart city construction. Since 2012, it has continuously issued a series of policy documents such as the smart Shenzhen planning outline and the "14th five-year plan" for the development of Shenzhen's digital government and smart city. It has made good achievements in the development level of smart city and the construction level of digital government, and belongs to the first echelon of China's smart city development [1]. Shenzhen has built the first new smart city management center in China. It is leading in China in supporting capacity building of a unified digital government platform and government services [1]. Shenzhen is also the earliest 5g independent networking city in China, with a solid foundation of informatization. At the same time, it also relies on the smart platform to realize the "digital citizen" plan, so that the achievements of digital society construction can better benefit the citizens [1]. During the "14th five year plan" period, the vision of Shenzhen's smart city development is to build a digital government leading city, promote the construction of high-quality digital society, and build a digital base benchmark city [7].

2.3.3. Future Development

The vision of Shenzhen's smart city development is to take the lead in building a digital base benchmark City, build a digital government to lead the city and boost the high-quality construction of

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a digital society. By 2025, build an international new smart city benchmark and a "Digital China" city model, and become a global digital pioneer city [7].

2.4. Discussion

Guangzhou, Shenzhen and Hong Kong have different urban positioning and development models, and naturally face different urban problems. Some of them have a rapid population growth, while others are facing the problem of negative population growth. However, these three cities still have many similar urban problems, the main problems are in population, urban planning and environment. These three cities, as the core cities of GBA, represent the development of this area in practical significance. These problems not only affect the sustainable development between their cities, but also have a decisive effect on the development of the whole region. Institutional innovation and modernization of governance capacity are important issues for the high-quality development of GBA [8]. Taking the core city as the growth pole, the cooperative overall planning and coordination mechanism as the guide, building a cooperation platform and other ways to steadily advance the construction of smart city will help solve the problem [9].

3. Conclusion

With the rapid advance of global cities, building smart cities has gradually become an important means to achieve urban sustainable development. Smart cities have developed well in Hong Kong, Guangzhou and Shenzhen, providing a reference and valuable template for China and the world. The construction mode of smart city is macro-control and public participation, which can effectively solve the common problems and special cases of the city. We cannot copy the successful experience of other cities in the construction process. We should adjust measures to local conditions and go out of our own way in line with the reality, so as to build a smart, successful city that meets the needs of the times.

A successful city belongs to everyone, so the construction of a smart city should be the result of joint efforts of many parties, which can be roughly divided into the following aspects.

First, the government coordinates and arranges relevant matters in a decisive position. Guide the development of smart cities by formulating relevant policies. For example, infrastructure construction, optimization of public services, integration and utilization of data resources are the foundation of smart cities.

Second, Relevant scholars and experts provide technical and theoretical support. Experts can determine the definition, evaluation system and theoretical framework of smart city in today's era through research. And their achievements in emerging industries such as the Internet of things, cloud computing and big data are important means to force the construction of smart cities.

Third, relevant practitioners provide financial support to relevant practitioners and have a keen understanding of market trends. They come from all walks of life and all fields. They have a very cutting-edge understanding of the market situation and future development, can help the government adjust the direction of development, and provide professional talents and financial support.

Fourth, the broad masses of residents represent the views of the majority. The number of residents is the largest, so they represent the most fundamental and extensive interest groups. Their needs, feedback and living habits directly affect the construction and development of smart cities. It plays an important role in building a "people-oriented" smart city.

Different cities have different needs in the construction process of different development stages. Obviously, with the acceleration of urbanization and the consensus of the world, the construction of smart city is an inevitable choice, and the construction of smart city will stimulate the new vitality of the city. In the course of the construction process, various online and offline ways can be used to

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attract public participation to obtain the most perfect urban planning scheme. A successful city belongs to everyone, and the construction of the city needs a variety of efforts. The future of this city will be better.

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