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Study on the Development Planning of Zhuhai Smart City

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Abstract—By analyzing the current situation of Zhuhai city and comparing it with the world-class smart city, this project summarizes the differences and deficiencies, and develops a future development plan based on the differences, and focuses on the core of the smart city, that is, the construction of operation ecosystem and industrial ecosystem for the smart city. The research can be divided into three aspects, namely, smart industry, smart people's livelihood and smart management, and they work together to form a smart city system. Relying on the support of existing smart industry and advancement of efficient smart infrastructure, Zhuhai will build a comfortable, low-carbon and intelligent working and living environment, attract high-tech enterprises to settle in, and gather high-quality and skilled talents, thus increasing the core competitiveness of the smart city of Zhuhai.

Keywords—Zhuhai; smart city; smart people's livelihood

I. INTRODUCTION

The construction of a smart city is an incremental process, and it will take two or three years for some cities and even ten years or more for others. "Smart City" is a new urban development mode integrating urban development planning, urban operation management, urban economic and social development, and the application of new generation information technology. It is an inevitable choice to promote cities' scientific development, leap-forward development and harmonious development, as well as a strategic commanding height to enhance the comprehensive competitiveness and international influence of modern cities.

II. PURPOSES OF BUILDING ZHUHAI INTO A SMART CITY

First, the construction of Zhuhai into a smart city will provide a more efficient resource utilization model. Resource output efficiency can be effectively improved based on optimized allocation of real-time state of resources. Extensive sharing of urban resources among regions and operational agencies enhances the utilization range of resources. The opening of urban resources to the public and enterprises at multiple levels and at various levels increases the utilization depth of resources. Real-time monitoring of resource utilization efficiency and the establishment of compensation mechanism for resource utilization can promote the establishment of resource-saving society. Second, a more flexible agile operation mechanism can monitor emergencies in real time and rapidly deploy resources to deal with them. The integration and collaboration between urban operation agencies can improve the transparency and efficiency of government work. It also can enhance the flexibility and agility in addressing social and environmental issues and quickly responds to changes in the socio-economic environment to achieve a more agile urban transformation.

Third, the construction will bring more convenient means of livelihood services and provide diversified means to achieve rapid innovation of service mode. The combination of virtual and physical environment improves the convenience of urban services. It aims at monitoring the state of urban operations in a more comprehensive way, preventing crime and conducting investigations more effectively, and reducing congestion and queuing, so that citizens can better balance work and life.

Fourth, it also aims to provide a more potential environment for industrial development, which includes ubiquitous high-speed broadband network and remote information access at anytime and anywhere, and more optimized and efficient urban infrastructure and industrial development service system. The sharing and interconnection of rich information can improve service innovation and industrial service level. Breaking the boundary of industrial separation will bring about a new industrial structure and promote the common development of intensive industries.

III. ACADEMIC VALUE AND APPLICATION VALUE

In the process of facilitating the construction of "smart city", Zhuhai will gradually change the technology-centered idea, establish the "people-oriented" concept, and build a ubiquitous social service environment. Smart medical care and smart community constantly promote people's life and learning. The project focuses on the development of smart infrastructure. In the course of promoting the construction of a smart city, Zhuhai makes great efforts to build urban information infrastructure, lays optical fiber backbone network, realizes wired network access and makes it cover the public area, increases network broadband, and promotes the integration of three networks, in order to build an interconnected urban information network and realize the



interconnection of ETC in expressway in Guangdong-Hong Kong-Macao Greater Bay Area. The project also concentrates on the development of smart management and services. During the construction, a number of key demonstration projects will be built, and the government's social and public management functions will be improved through various information means, and the level of urban management and service functions will be greatly improved, so as to promote harmonious and sustainable urban development. The project puts emphasis on the development of smart humanities and smart life. Both the government and enterprises are making efforts to improve people's life style. They should build a smart city from three aspects, namely, wisdom, low carbon and happiness, and take it as a breakthrough to build a national innovative city.

IV. RESEARCH PROGRAMME

A. Research Objectives

Zhuhai is located in the southwest of Pearl River Estuary in Guangdong Province. It faces Hong Kong across the sea from the east, connects to Macao from the south, is adjacent to Xinhui District of Jiangmen City and Taishan City from the west, and borders on Zhongshan City from the north. Based on the four-in-one development concept of "lowcarbon ecological economy, smart city, smart technology and happy life", this project plans to build a low-carbon, smart and happy industry and a livable city. Taking its new urbanization development road as the lead and the world advanced smart demonstration city as the benchmark, Zhuhai fully implements the four-in-one development decisionmaking and arrangement, takes the advantages of smart industry agglomeration and abundant ecological resources, realizes the urban positioning of intelligent economy headquarters area, intelligent application promotion area, urban-rural integrated demonstration area and ecological livable model area, and constructs itself into a smart city.

B. Research Content

1) The first stage: planning stage (2019-2020) — planning and programming

a) Developing construction content: Infrastructure platform construction refers to the construction of smart urban infrastructure and intelligent processing platform based on cloud computing. Experience system construction consists of the establishment of smart city decision-making display system and user experience system serving people's livelihood projects. The construction of demonstration application projects includes the construction of intelligent transportation, urban infrastructure, public emergency decision-making, energy and resource management, etc. In terms of key technologies, it aims to break through intellisense, ubiquitous interconnection, data activation, security and credibility, service delivery and other technologies.

b) Setting a smart city framework: It is divided into three parts: smart management, smart people's livelihood and smart industry.

In terms of smart management, smart city decisionmaking system includes unified management system for intelligent water and energy, unified dispatching system for intelligent transportation, unified management system for intelligent communication, optimized allocation system for modern service industry, unified management system for egovernment and e-commerce, and urban intelligent emergency response and monitoring management system. Finally, the smart city demonstration hall conducts command and dispatch. LCD interactive screen demonstrates the operation status of each system in the way of threedimensional electronic map, video, image and text.

Smart people's livelihood is reflected in smart communities. Family is the basic cell of society, and people are the basic elements of family. The government agency, that is, neighborhood committee, manages and serves the community residents. At the same time, they also supervise and guide the residential property management company, so as to realize the informationization of community management, household informationization, intellectualization of the community and 5-minute business planning.

Smart industry is mainly reflected in the construction of cloud platform, intelligent tourism, intelligent aviation and intelligent technology. Based on people-oriented and scientific management principles and taking information technology as an auxiliary means, intelligent tourism organically combines planning and management, protection and development of tourism industry with information technology, which is conducive to the promotion of tourism industry, protection of tourist attraction and its sustainable development, and provides people with flexible, convenient and efficient tourism services.

2) Construction stage (2020-2022)

a) Adopting the layout of city-industry integration with multiple functions, and focusing on the development of smart industry: Zhuhai smart city has initially formed an industrial cluster of tourism, aviation, medicine and information technology, but the driving force for industrial development needs to be strengthened and the direction of development also needs to be further clarified. Therefore, it is necessary to give full play to the industrial foundation role of software park, enhance the scientific research ability of surrounding universities, realize the coordinated development of industry, education and research, and build the most high-end intelligent industrial cluster park in China dominated by high-end software and new-generation information technology industry. Zhuhai plans to take capital and technology as the core and innovation as the leading, actively participates in regional competition, attracts major big data enterprises from home and abroad to settle in, and relies on the high value-added links of information industry constructed by big data enterprises, so as to form core competitiveness, promote all-round development of the information industry, and expand the Internet of things, cloud platforms, next-generation Internet, mobile communications, e-commerce and other industries.



b) Constructing a smart industry-city integration mode with multiple functions: With the group as a unit, a smart industry-city integration mode with multiple functions will be built to achieve a balance between work and housing and complete perfect supporting facilities. According to current industrial development direction and enterprise selection of Zhuhai, combined with the current enterprise lavout and key industrial projects settlement plan in recent five years, it plans to divide Zhuhai into five smart urban districts, each of which consists of a core leading industry, residential community, business service center and lake area where can accommodate about 1 million people. Business service center is arranged based on bus stops and lake area to meet people's daily shopping, leisure and other living needs. In addition to self-occupation, the surplus living area can be rented to urban enterprise staff, and a small number of commercial housing can be used for sale, which can not only meet the needs of living in science and technology cities, but also bring certain economic income to citizens.

c) Establishing intelligent ecosystem and realizing the symbiosis of nature and city: Zhuhai is located at 21 48'-22°27' north latitude, 113°03'-114°19' east longitude. Situated in the southwest of Pearl River Estuary in Guangdong Province, Zhuhai faces Hong Kong across the sea from the east, connects to Macao from the south, is adjacent to Xinhui District of Jiangmen City and Taishan City from the west, and borders on Zhongshan City from the north. It has eight national first-class ports, including Gongbei, Jiuzhou Port, Zhuhai Port, Wanshan, Hengqin, Doumen, Wanchai, and Zhuhai-Macao cross border industrial zone. At the same time, it is the city with the largest ocean area, the largest number of islands and the longest coastline in Pearl River Delta and often named as "city in hundred islands". The project integrates modern ecological techniques into the landscape pattern of south of the Five Ridges, focusing on the study of rain-flood process, biological process and recreation process. The study of rainflood process mainly refers to the comprehensive analysis of the current water body, the calculation of runoff corridor, rainstorm submerging range and typhoon flood submerging range, and establishment of a spatial pattern in line with the rain flood process. The study of biological process means to select the unique protected animals in Zhuhai as indicator animals, simulate the horizontal migration process and conduct suitability overlay analysis, and obtain the biological protection security pattern. The study of recreation process means to combine the natural landscape with the human landscape by using the existing historical relics, local buildings, forest parks and urban parks, and form different levels of recreational safety patterns according to the importance and density of recreational resources and corridors.

d) Constructing an ecological security pattern of traffic guidance and establishing an efficient and intelligent low-carbon transportation system: The plan advocates a travel model dominated by public traffic and slow traffic, promotes public transportation systems and public bicycle systems based on light rail, subway, trancar and public buses, and sets up seamless transfer stations and connection stations, so as to achieve the goal of arriving at the airport within 20 minutes in Zhuhai urban area. Meanwhile, intelligent traffic systems such as traffic perception, signal control, parking guidance and public information will be established to effectively solve traffic congestion and other problems.

e) Establishing high-standard smart public service facilities, and applying existing information technology to urban core systems: The smart city should make "top-level planning", promote smart facilities to the fields of administration, transportation, energy, ecology, community, health care and education, establish unified standards and norms, coordinate public platforms with their subsystems, and ensure resource sharing on the basis of coordinated database. Network facilities should be built first to expand the coverage of the wireless broadband network, promote the integration of three networks, and gradually improve the construction of information security infrastructure. They should integrate and upgrade the existing data resources, and gradually promote the application platform according to the principles of technology maturity, ease, importance and urgency of application.

In terms of smart buildings, terminals not only undertake doorbell business, but also can be embedded in the community security video surveillance. Video information from different locations in the community can be acquired through the regional network to view and monitor the activities of the garage and family members, especially the elderly and children, so as to build a high-security and highintelligence community. "Intelligent Pharmacy" platform utilizes high-standard IDC infrastructure to construct and maintain pharmacy data center, pharmacy supervision system data center and social security drug data center at a low cost, and standardizes the order of drug market and medical and health care products market through the establishment of drug channel management platform and pharmacist supervision platform, to promote the healthy development of the pharmaceutical industry. "Intelligent Pharmacy" platform utilizes China Mobile's high-standard IDC infrastructure to construct and maintain pharmacy data center, pharmacy supervision system data center and social security drug data center at a low cost, and standardizes the order of drug market and medical and health care products market through the establishment of drug channel management platform and pharmacist supervision platform, to promote the healthy development of the pharmaceutical industry.

Electronic ticketing system provides a whole process of integrated support ticketing services of "reservation, ticket issuing, ticket checking, management, data and settlement", including voice, mobile phone, network, multimedia terminals, and other channels of access services. Unified voucher (two-dimensional code) carriers will further enrich and improve the coverage of ticketing sales, and cover film tickets, concert tickets, scenic spots tickets and other comprehensive ticketing markets, which can effectively



improve ticketing efficiency and service quality and promote the direct economic benefits of mobile users ticketing. Mobile phones' one-card system integrates various application functions such as access control, garage, attendance, computer access, books, electric control, water control and consumption into a smart card with RFID function to achieve intelligent management support for enterprises in the park. Intelligent comprehensive security adopts flexible and convenient real-time monitoring, easy and efficient retrieval of return visits, rich and diverse alarm management, role-based user management, unified and intuitive management maintenance, providing real-time and efficient security guarantee for the park.

3) Promotion stage (2022-2023): To strengthen government support and enhance propaganda, media conferences can be held to announce the construction plan for Zhuhai smart city. It is also necessary to organize selection activities of excellent solutions for Zhuhai smart city, increase citizens' participation, and conduct publicity and promotion through online media and print media.

V. CONCLUSION

Building Zhuhai into a smart city is an inevitable requirement of urbanization development, as well as the need to adjust industrial structure, transform and upgrade traditional industries and increase the proportion of strategic emerging industries. More than 600 cities around the world are building "smart cities". At present, more than 50 cities in China are planning to build smart cities. The construction of smart city is becoming one of the basic elements of the competition among global cities. It is the "name card" to prove a city's informatization level, as well as an important means to maintain the city's competitiveness.

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