

Research on the Construction of Smart City for Xiamen

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Abstract

2021 is the opening year of "The Fourteenth Five-Year Plan" and the critical year of new infrastructure. The R & D and application of new generation of information technologies such as 5G, the Internet of Things, and the Industrial Internet lead the construction of smart cities to develop in the direction of deepening realism, collaborative layout, and social and ecological win-win, bringing new opportunities and challenges to the construction of smart cities. Based on the literature research on the current situation of intelligent cities at home and abroad, this paper profoundly understands the construction effect of intelligent cities in Xiamen in three aspects: intelligent government affairs, smart people's livelihood, and intelligent industry. It puts forward suggestions to promote the construction of intelligent cities in Xiamen. Xiamen should seize its advantages and combine its characteristics to form its own unique set of top-level design framework of intelligent city, strengthen the breadth and depth of data empowerment, improve the talent training mechanism of intelligent city, and construct the smart city model of digital construction in Xiamen.

Keywords

Xiamen; Smart City; Smart Livelihood; Smart Industry; Smart Government.

1. Introduction

"Overall urban planning of Xiamen (2011 –2020)" proposed that Xiamen is a special economic zone in China. It is necessary to enhance the city's radiation driving ability continuously, and gradually build Xiamen into a modern city with unprecedented economic prosperity and harmonious livable characteristics. It plays a portal role in promoting the joint development of both sides and builds the 21st Century Maritime Silk Road.

Table 1. Summary of intelligent city policies in Fujian Province and Xiamen City in the past three years

Release year	Number of policies	Policy
2019	2	"Notice of the General Office of the People's Government of Fujian Province on Printing and Distributing the Key Points of Digital Fujian Work in 2019"; "Notice of the General Office of Xiamen Municipal People's Government on Printing and Distributing the 'Digital Xiamen·Broadband Project 'Action Plan'"
2020	2	"Notice of the General Office of the People's Government of Fujian Province on Several Measures to Further Support 5G Network Construction and Industrial Development"; "Notice of the Office of the People's Government of Fujian Province on the issuance of the three-year action plan for the construction of new infrastructure in Fujian Province (2020 -2022)."
2021	3	"Notice of the People 's Government of Fujian Province on the issuance of the work plan of the National Digital Economic Innovation and Development Experimental Zone (Fujian)"; "Fujian Province to speed up the establishment of a sound green low carbon cycle economic system implementation plan"; "Implementation of Xiamen National Economic and Social Development Plan 2020 and Draft National Economic and Social Development Plan 2021."

In recent years, in response to the call of national policy, Xiamen has actively promoted the construction of smart cities and urban governance, and has won national demonstration honors such as "China's top ten smart cities" and "China's innovative government leading cities".

With the rapid development of the information society, intelligence and big data have become the theme of the times. With the crystallization of the integration of information technology and urbanization, "smart city" becomes a new model of contemporary urban development. Based on the top-level framework of "smart city" of Xiamen, this paper analyzes the current smart construction level of people's livelihood, industry and government in Xiamen, and combines the construction experience of smart cities at home and abroad to put forward suggestions for promoting the construction of smart cities in Xiamen.

2. Literature Review

2.1. Research Status of Smart City in Foreign Countries

At present, there are more than 1000 smart cities that have been started or under construction in the world, and more than 500 are under construction in China, far exceeding the second-ranking Europe (90). The world has set off a boom in the construction of smart cities, among which Europe and Asia are more active areas in the building of smart cities. With the development of the world to digital, smart city construction is also in full swing. Foreign scholar Lin (2019) proposed in his research that the rise of digital networks worldwide will change the appearance of previous cities and generate new types of social relations, which will become the key to their infrastructure construction. Macke (2018) and others believed that building a successful smart city integration framework mainly includes eight factors: technological level, policy instruments, organizational structure, community services, natural resources, infrastructure construction, government governance management, and economy. Camboim (2019) pointed out in his study that cloud, big data, LoT, video, and artificial intelligence will become the new five elements of a smart city. So far, many foreign scholars have made significant research results on the wisdom of urban construction and urban management.

In the current era of information, in addition to traditional functions, cities should also consider their functions as information communication centers and network technology centers. Regarding the fundamental theoretical research of intelligent cities, scholar Jing (2018) pointed out that electronic information technology will make the components of the scattered and independent cities more relevant. Urban life tends to be happier and more dynamic. Then Lin (2019) proposed in his research that the rise of digital networks on a global scale will change the appearance of cities in the past and generate new types of social relationships, which become the key to their infrastructure construction. In this regard, Liang (2020) thoroughly explained the impact of this new type of city on all aspects of the economy, society, and culture. In addition, Avdeeva (2019) discussed the construction of a new kind of city characterized by "smart" Possible benefits for future urban life. It can be seen that Ardito (2019) regarded ICT as an essential infrastructure for a city, such as water supply and energy, while Sun (2020) believed that ICT is a new type of "hardware" facility. Still, only as an auxiliary device, the significance is to give other parts of the city more "smart" capabilities. Since its development, many foreign scholars have further studied and explored the relationship between information and communication technology, urban construction, and urban management. They have achieved quite an important series of research results.

Regarding the connotation of intelligent city, Chou (2017) pointed out that a smart city makes it possible for citizens to share knowledge, communicate life, and exchange culture, which can effectively stimulate the creativity of urban residents and provide inspiration for life. Zhang (2019) specifically pointed out that the leaders of cities should integrate information and communication technology into the innovation and development of society, to make

community more convenient, fluid, efficient, and low energy consumption, form an intelligent world with a comfortable natural environment, faster decision-making and harmonious cooperation, and provide quality and convenient social public services in the form of intelligent cities as its leading service, so that citizens can get a happier life. Wang (2020), Yong (2020) further proposed that ICT should be integrated into the functions of urban public services, thereby reducing the process of government and institutions providing urban services and enabling cities to achieve sustainable development. Overall, a smart city mainly refers to the use of information and communication technology, the development and improvement of social services and social governance level, to lay the foundation for citizens more petite legs, enterprises more innovation, rapid government decision-making.

2.2. Research Status of Smart City in China

Emphasis on the transformation of information and communication technology to the urban operation system, the typical understanding is "digital city + Internet of things = smart city." Zhang (2019) studied this understanding, which was reflected in the practice of intelligent city construction. Many places paid particular attention to the use of emerging information technology and the construction of advanced information infrastructure. P.B. Feng (2019) constructed an intelligent city by building advanced network infrastructure and equipping it with some high-tech information technology. Li (2017) responded that in recent years, the top-level design of smart cities in many parts of China has been undertaken by smart city integrators and general contractors, and it is some government information projects such as cloud computing, government affairs platform, intelligent transportation, intelligent education, and competent medical care.

Emerging information technology and information infrastructures are essential components of smart cities and fundamental support factors for smart cities (H.X. Xue, 2018). Zhang (2019) also pointed out that smart cities should be based on ICT technology to promote the sustainable development of the urban economy, society, and ecology.

What's more, Luo (2018) analyzed and recognized "smart cities" from the perspective of dynamic development, highlighting the process of intelligent cities making themselves more "smart" by using information technology to achieve innovation and development. Zhang (2019) pointed out that the application of information technology has also led to the transformation of urban economic and social operation mode and development mode, and promoted the development of the whole city to become a more intelligent city.

Smart cities emerge with the development of information technology. Song (2018) proposed that the foundation of this emerging urban form of smart cities should be advanced information technology and be constructed for the innovation environment of the knowledge society. Li (2018) believed that the premise of building a smart city should be multi-faceted understanding, application of intelligent integration and widespread Internet broadband, creating an excellent ecological environment, and building innovative mechanisms. Fu (2019) proposed that smart city belongs to the sum of a digital city, Internet of Things, and cloud computing, and has formed a digital city. A smart city should be constructed by using a grid, intelligent transportation, and urban safety emergency.

Based on the perspective of development and utilization of resources, T.Y. Zhang (2019) expounded the great significance of replacing digital cities in building smart cities and deeply analyzed the close relationship between information, software, organization, and smart cities. L. Cao (2019), based on the current achievements in the construction of digital cities, to effectively build smart cities, can save resources, optimize and upgrade the resource structure.

3. Present Situation of Smart City Construction of Xiamen

3.1. Smart city construction of Xiamen

In 2021, under the guidance of "The Fourteenth Five-Year Plan for the Economic and Social Development of Xiamen and the Outline of the Vision Target for 2035", Xiamen has accelerated the layout and construction of new infrastructure, promoted the comprehensive integration of digital technology into various fields of production and life, promoted the innovation of public service and social operation mode, and constructed a digital life enjoyed by the whole people. It has become a model city for the integration and application of new infrastructure in China.

At the same time, to promote the construction of Xiamen's smart city, the Office of Xiamen Municipal People's Government issued a notice on "Three-year Action Plan for Promoting New Infrastructure Construction in Xiamen (2020-2022)," which mentioned that in the construction of new network infrastructure, new computing infrastructure, new integration infrastructure, and new platform infrastructure, we should do an excellent job of subdivision and promote the steady progress of infrastructure work in all aspects.

3.2. Effect of Xiamen Smart City Construction

3.2.1. Effect of Xiamen Smart Government Service Construction

In 2014, the "I Xiamen" one-stop information service platform was launched, which realized the docking of 27 government departments, 40 business systems, and 286 application services, and provided comprehensive convenience services for citizens and enterprises. By the end of 2019, the number of registered users of the "I Xiamen" platform exceeded 2.9 million, and a total of 28 government departments, 51 business systems, and 310 applications services were integrated. It was awarded the "Top 50 Digital Government Feature Selection-Digital Government Demonstration Leading Award" and "Top Ten Excellent Innovation Cases at the National Municipal Level." "I Xiamen service system construction practice" also won first place in the national welfare service project, and has been rated as "2018-2019 typical excellent case of new smart city construction evaluation".

In addition, in 2017, Xiamen began the construction of the "E-Government" self-service station. Xiamen "E-Government" self-service station can handle 94 matters involving ten departments such as passports, social security, and provident fund through data connectivity and in-depth development. In 2020, "E-Government affairs" was rated by the State Council as a typical case of optimizing the business environment. The proportion of "one trip without running" matters in municipal approval services increased to 83.4 %, the number of "one event" integrated packages reached 680, and the number of municipal "whole city general office" matters increased to 1800.

3.2.2. Effect of Xiamen Smart Livelihood Service Construction

In terms of intelligent transportation construction, Xiamen's big data intelligent traffic management framework is initially composed of "one center, six systems, and 21 subsystems". Among them, the "super brain" of Xiamen's intelligent transportation management -Xiamen's comprehensive transportation operation information service platform gathers massive data collected by 3500 monitoring roads, the qualification information of 120,000 transportation practitioners, and the real-time dynamics of all passenger vehicles. It has built an intelligent platform with six functions of situation assessment, dynamic monitoring, decision analysis, dispatching command, facility management, and information service, and realized accurate analysis, proper service, accurate governance, accurate supervision, and accurate feedback.

5G technology is widely used in the integration of new technologies and transportation. In September 2018, the Xiamen 5G-oriented Internet of Vehicles Intelligent Bus Demonstration Project was officially released. Up to now, the project has built a 5G vehicle-road collaborative

big data platform, completes the intelligent transformation of 60 km BRT road and five light traffic intersections in Xiamen, as well as the intelligent network transformation of 50 BRT buses, one autonomous bus, and one autonomous logistics vehicle, and released six intelligent network applications: over-the-horizon collision avoidance, real-time vehicle-road collaboration, green wave traffic and guidance, optimal speed control, safe and accurate parking and unmanned driving. In August 2020, the project successfully passed the acceptance review of the expert group organized by Xiamen Public Transport Group, marking that the project has officially become the first intelligent online vehicle road coordination project in China that has been verified by a mature business model. In 2021, Xiamen Metro Line 3 was entirely laid 432 5G.

In terms of smart medical care, one must establish intelligent health records to assist residents in self-management. Brilliant health records use intelligent computing and machine learning methods to provide all-around services, including health assessment, diagnosis, and medication brilliant reminder, rehabilitation management before, during, and after diagnosis in real-time. At the same time, Xiamen has set up a smart maternal and child health service platform and a pediatric smart guidance platform in the country. By building a big data + AI research and application platform, meets the new needs of people's health and opens a new era of intelligent medical treatment.

Besides, to solve the people's most concerned, the most direct, the most realistic health problems, improve people's livelihood and health well-being, Xiamen City, the construction and application of "medical health cloud" to create the city's medical institutions medical card, outpatient card, patient settlement waiting for average time compression of nearly two thirds. Thus, it is to build a new coronal traceability system, the use of big data technology joint defense control. During the new coronavirus epidemic in 2020, the monitoring and traceability system of new coronavirus pneumonia in Xiamen was launched, the data-sharing platform of medical health cloud and municipal government affairs was fully utilized. By expanding data collection and opening up data channels, the prevention and control headquarters, municipal health committees, and disease control centers of Xiamen were assisted to grasp the epidemic situation of new coronavirus pneumonia in the city in time, and help to realize " external prevention input and internal prevention and diffusion."

3.2.3. Effect of Xiamen Smart Industry Construction

In 1998, in order to speed up the development of software industry and promote the economic development of Xiamen, Xiamen government invested in building Xiamen Software Park. Xiamen Software Park included Software Park Incubation Base (Phase I), Software Park Industrial Base (Phase II), and Software Park (Phase III). It has won many national honors, such as the National Torch Program Software Industrial Base, the Demonstration Base the Introduction of Foreign Intelligence by Software Development Countries, and the Training Base of Xiamen National High-tech Zone for Talents of China's High-tech Zone. In April 2020, successfully selected the first 12 national digital service export base.

Modern service industry is also an important part of the construction of " smart city." Xiamen has initially formed an industrial sector led by the software and information service industry, e-commerce and modern logistics, computer and communication equipment industry chain and supporting industries, and flat panel display industry chain and supporting industries. It has constructed a "smart industry" system of "industry-assistance and industry-use," formed a number of "smart industry" demonstration projects, built industrial clusters with output value exceeding 100 billion, and effectively promoted the informatization construction of Xiamen and the sustainable development of "smart city" construction.

4. Countermeasure

4.1. Scientific Development of Top-level Framework Design

The top-level design of "smart city" covers the essential elements of the outer layer (national strategy, urban development strategy, urban planning and construction, natural environment, policy environment, talent system, technology, industrial ecology, etc.) and the three core elements of the inner layer (competent government, intelligent citizens, intelligent enterprises). The outer layer is the foundation and condition for the construction and development of "a smart city." The inner layer is the content and object of the structure and service of "a smart city." The urban people's government should study and formulate the intelligent city construction plan from the overall strategic of urban development situation.

Xiamen's smart city construction should scientifically and reasonably formulate the top-level design plan of intelligent city construction. Based on the national strategy, Xiamen's development strategy and future urban planning, analyze Xiamen's smart city strategy. According to the development needs of the government, citizens, and enterprises, the business architecture, application architecture, information architecture, and technical architecture of Xiamen's smart city are summarized and designed to provide the source power for Xiamen's smart city construction, governance and sustainable operation.

4.2. Share Data

Intelligent city construction involves many aspects of urban construction. It is necessary to make full use of the new generation of information technology to comprehensively manage, operation mode, and long-term mechanism of an intelligent city. Therefore, the construction of Xiamen's smart city should aim at network connectivity, resource connectivity, service connectivity, and industrial revitalization. The municipal government should promote the construction of information sharing and business collaboration mechanism, coordinate the interconnection of data between multiple government departments, solve the problems of mutual independence and repeated data collection among various departments, build an innovative management mode of city-community-family comprehensive collaboration, and build an information resource integration platform for the construction of Xiamen's smart city.

4.3. Cultivate Talent

The construction of a smart city needs the injection of talents. Therefore, Xiamen can cooperate with well-known universities and national scientific research platforms abroad to run schools, strengthen industrial-university cooperation, and jointly build open and innovative first-class higher education and research bases. It can also attract famous foreign universities and research institutes to establish collaborative colleges, collaborative laboratories, collaborative technology research, and development centers and achievement transformation bases in Xiamen, and select first-class universities to Xiamen to jointly or independently run application-oriented disciplines institutions highly related to the development of Xiamen's digital economy industry. In addition, highlight the leading role of talent in the digital economy, pay attention to emotional retention, strengthen policy attraction. To industry demand-oriented, carry out research, identify potential digital economic cooperation object.

5. Results and Discussion

The Smart city is a new concept and mode to promote the wisdom of urban planning, construction, management, and service by using the new generation of information technology such as the Internet of Things, cloud computing, big data, and spatial geographic information integration. The construction of a smart city is of great significance to accelerate the integration of industrialization, informatization, urbanization, and agricultural modernization, and

improve the ability of sustainable urban development. This paper makes a rigorous theoretical analysis and normative, empirical analysis of the background and current situation of Xiamen's smart city construction, and finds that Xiamen's smart city construction has made significant achievements in government services, people's livelihood services, and industrial construction. Based on the existing construction, three suggestions are put forward for the government of Xiamen to promote the construction of a smart city for Xiamen. Smart city construction is a gradual process, and local governments need to dynamically adjust the direction and make plans according to the situation. Therefore, the construction of Xiamen smart city still needs to speed up the construction of smart city standard system, integrate various forces, and build smart city of Xiamen mode.

6. Research Limitations and Future Research Directions

At present, this study still has limitations. First, it is difficult for us to obtain comprehensive and specific information in the survey of the current situation of smart city construction in Xiamen, and the survey results cannot be fully presented. Secondly, the division of research dimensions of Xiamen's smart city is relatively simple. We suggest that future researchers can examine and evaluate the effectiveness of smart city construction from more dimensions. In addition, we will continue to investigate the construction of smart city in Xiamen, to construct an evaluation index system suitable for the construction of smart city in Xiamen.

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