

The Historical Changes and Evolutionary Logic of China's Smart City Development Policies

-- Based on the Perspective of Historical Institutionalism

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ABSTRACT

With the development of modern high and new technologies such as the Internet, the trend of urban intelligence is obvious. Smart city construction has become an important way for cities to carry out high-quality development and an important carrier for the construction of digital China. From the perspective of historical institutionalism, the development policies of smart cities in China have gone through three stages: exploratory development, active promotion, and strategic deepening. The policy evolution of smart cities is analyzed based on structural logic and is influenced by the comprehensive factors of economic environment, development philosophy, and technological level; According to historical logic analysis, it exhibits obvious path dependence characteristics under the influence of factors such as coordination effect, learning effect, and adaptive expectations, as well as key nodes for policy transformation; The transformation of public demands, rational government choices, and collaborative efforts between government and enterprises collectively constitute the driving force for policy change. Looking ahead to the future, China's smart city development policies need to improve laws and regulations, break away from path dependence, and truly promote the improvement of urban governance capabilities and levels.

KEYWORDS

Smart City; Historical Institutionalism; Policy Changes.

1. INTRODUCTION

With the rapid increase in urban population and continuous expansion of scale, the shortage of resources has led to many economic, social, and environmental problems in cities. How to better govern cities and maintain their sustainable development has become a major issue that urgently needs to be solved in China's urban development. Since 2008, "smart cities" have gradually become a key focus of planning and construction for countries, regions, and cities around the world, and have become the dominant direction and core strategy for obtaining a new round of global urban competitiveness. At present, the construction of smart cities has become a national strategy and a widespread practice in Chinese cities. Since 2012, China has launched three batches of smart city pilot projects, and more than 500 cities have proposed or participated in the construction of smart cities. A large number of policy documents related to the development of smart cities have been issued, forming a policy system covering the overall architecture and specific applications of smart city construction.

2. THE HISTORICAL TRAJECTORY OF CHINA'S SMART CITY DEVELOPMENT POLICIES

2.1. Exploration and Development Stage (2008-2011)

Since the concept of smart cities was first proposed by IBM in November 2008, it has been widely spread worldwide. Several cities in China, including Beijing and Tianjin, have successively proposed plans to build smart cities. During the period of 2008 to 2011, the central government did not provide a strong response to the proposals of these cities regarding smart cities, and did not issue targeted policy documents on smart city construction. The reason why this stage is called the exploration and development stage of smart city policies is precisely because during this period, although the government did not issue specific policies for smart city construction, various departments issued a large number of policy documents on urban information infrastructure and e-government, which are necessary supporting documents for smart city construction, laying a solid foundation for the subsequent comprehensive promotion of smart city construction.

Before the concept of smart cities emerged, in 2007, China promulgated the "Regulations on the Disclosure of Government Information of the People's Republic of China" to promote government efficiency and protect citizens' right to know. The regulations clearly defined the scope of government information disclosure, disclosure requirements, and supervision and protection. The development of e-government in China reached a milestone and indirectly promoted the informationization reform of the government in the subsequent construction of smart cities. To ensure the smooth operation of smart cities, the government has issued the following policies regarding the construction of urban information infrastructure, including broadband and communication technology. The Notice of the General Office of the National Development and Reform Commission on Organizing and Implementing the 2008 New Generation Broadband and Network Communication Industrialization Special Project, issued in 2008, put forward higher requirements for fixed broadband and communication technology related to the operation of smart cities. The article points out the need to strengthen support for key technologies in broadband and communication fields, and strive to break through technological bottlenecks in these areas; Simultaneously promoting the industrial transformation of scientific research achievements in the field of communication to achieve the effect of large-scale application of technology. The article also points out the need to expand the application scenarios of communication technology on the demand side, develop digital technology and network collaboration technology to create a favorable development environment for the broadband communication industry. In 2010, the Ministry of Industry and Information Technology, the National Development and Reform Commission, the Ministry of Science and Technology, and others issued the "Opinions on Promoting the Construction of Fiber Optic Broadband Networks", which emphasized the important role of fiber optic broadband industry development in urban information infrastructure. The article has made clear requirements for the understanding cultivation, supporting measures, industry guidance, and development innovation of fiber optic broadband network construction. In 2011, the General Office of the State Council issued the "Notice on Further Strengthening the Management of Government Websites", which further promoted the development of e-government and provided guidance on the problems existing in government websites. The article emphasizes the role of government websites in maintaining government credibility, and points out the need to clarify the responsibility for website operation and optimize functional allocation, in order to respond promptly to public interaction; At the same time, strengthen the standardization and control of website content, and supplement the technical strength to maintain website security.

It can be seen that although the government did not explicitly mention smart cities in its policies during this stage, it promoted the industrialization of broadband communication technology in the construction of urban information infrastructure, facilitated the informationization development of enterprises, and provided a good technical soil for the construction of smart cities; At the same time, the government itself has improved its understanding of databases, strengthened the quality of

government information services, and improved the supervision and management process of information through the promotion of e-government.

2.2. Active Promotion Stage (2012-2016)

Compared to the previous stage of policies that focused more on early stage reserves, since 2012, the country's emphasis on smart cities has been fully expressed at the policy level, and the construction of smart cities has entered an active promotion stage. At this stage, the country has explicitly included the construction of smart cities in the national industrial planning, and has promoted the pace of smart city construction through pilot promotion, elevating the concept of smart cities from local attempts to national level strategic deployment.

In the Notice on Issuing the Industrial Transformation and Upgrading Plan (2011-2015) issued by the State Council in 2012, based on the development of the Internet of Things industry, it was pointed out to expand the application fields of the Internet of Things, combine the intelligent processing properties of the Internet of Things with the infrastructure required for smart city construction. In August 2014, eight departments including the National Development and Reform Commission, the Ministry of Industry and Information Technology, and the Ministry of Science and Technology issued the "Notice on Issuing Guiding Opinions on Promoting the Healthy Development of Smart Cities", which has since provided clear guidance for the construction of smart cities in China. The article emphasizes the strategic position of smart city construction, affirms the role of smart cities as a new model of urban governance in enhancing urban governance and sustainable development capabilities, and also points out that there are still many safety hazards and risks that need to be improved. In addition, the following basic principles have been formally proposed: "people-oriented, pragmatic promotion", ensuring that the achievements of smart city construction are used for the people; Adapting measures to local conditions and following a scientific and orderly approach to ensure the rational coordination of the construction process of smart cities based on the needs and conditions of different cities; Market oriented, collaborative innovation "promotes the maximum preservation of the innovation vitality of market entities in the construction of smart cities; 'Controllable and manageable, ensuring safety', to maintain the inevitable risks and hidden dangers in the construction of smart cities. In November 2012, the General Office of the Ministry of Housing and Urban Rural Development issued the "Notice on Carrying out the Pilot Work of National Smart Cities", marking the entry of China's smart city construction into the unique development fast lane of policy pilot. The article clearly stipulates the application and evaluation process for pilot cities of smart cities, and confirms the pilot cities through a fair and impartial acceptance process. To date, more than 700 cities have been designated as national smart city pilot cities, making significant contributions to the diversified exploration of China's smart city construction. In August 2014, the Ministry of Industry and Information Technology issued the Guiding Opinions on Strengthening Network Security in the Telecommunications and Internet Industries, which further emphasized the important role of network security in the development of the network economy. It pointed out that network security technology needs to keep pace with the development of information technology and constantly strengthen the network security mechanism. The further promotion of network security work provides strong guarantees for the active promotion of subsequent smart city construction. In 2014, the National Standardization Management Committee issued a notice on the establishment of the National Smart City Standardization Coordination Promotion Group, Overall Group, and Expert Consultation Group. Since then, the construction of smart cities has gradually moved from "tailored to local conditions and needs" in various cities to the sharing of advanced experience nationwide and the establishment of a smart city construction evaluation index system that is in line with China's national conditions. Smart city construction has entered the fast lane of standardization and normalization.

It can be seen that during this stage, the national level has comprehensively promoted the construction of smart cities from top to bottom, issuing a series of top-level designs such as the development plan for smart city construction at the central level, strictly selecting local areas for smart city practice

pilot projects, exploring the development path of smart cities, and ultimately promoting the standardization and normalization of China's smart city construction.

2.3. Strategic Deepening Stage (2017-now)

Since 2017, the development of smart cities in China has entered a stage of strategic deepening. After General Secretary Xi Jinping put forward the concept of a new smart city in December 2015, he put forward the idea of building a smart society in the report of the 19th National Congress of the Communist Party of China in 2017, marking the initial exploration and layout of China's smart city construction from intelligent infrastructure, equipment manufacturing and other hardware construction. The comprehensive and in-depth development of software construction, including the application of smart society, the development of smart industries, and related institutional mechanisms, has also become a new direction for the development of smart cities in China.

In 2017, it was the second year for the country to launch the construction of new smart cities. This year, the construction of new smart cities has accelerated, with the integration and sharing of data resources, greatly improving the level and operational efficiency of cities. At the same time, the inter ministerial coordination working group for the construction of new smart cities also completed the evaluation of domestic new smart city construction for the first time this year, and released the "New Smart City Development Report 2017". In the same year, the General Administration of Quality Supervision, Inspection and Quarantine and the National Standardization Management Committee approved 425 national standards, including the "Smart City Technology Reference Model". To guide higher education institutions to aim at the forefront of world technology and continuously improve the technical standards for smart city construction set by the General Administration of Quality Supervision, Inspection and Quarantine and the National Standardization Management Committee. In October 2017, the report of the 19th National Congress of the Communist Party of China proposed to "build a network power, a digital China and a smart society, and promote the deep integration of the Internet, big data, artificial intelligence and the real economy". Digital China has entered a new stage of comprehensive penetration, cross-border integration, accelerated innovation, and leading development. Technological system innovation, management mode innovation, and service mode innovation will enter various fields of national economic and social development, building a comprehensive digital China and smart society, and pointing out the direction for the construction and development of new smart cities.

In 2019, the Ministry of Industry and Information Technology, the Ministry of Education, the Ministry of Human Resources and Social Security and others issued the Notice on Printing and Distributing the Guidance on Strengthening Industrial Internet Security, to further promote the integration of industry and education, school enterprise cooperation, establish a joint training mechanism for security talents, and cultivate complex, innovative and highly skilled talents. After the large-scale construction and top-level planning of information infrastructure and other hardware facilities in the first two stages, the vitality of social information development has been stimulated, and the focus of smart city construction has also shifted to the implementation of various plans. At this time, the focus is on how to ensure the implementation of plans and promote policy implementation.

Implementation of the "Information Security Technology - Guidelines for Information Security Protection in Smart City Construction" in 2020. Provide a basis and reference for information security assurance in the dimensions of construction, operation and maintenance involved in the planning and demand analysis of smart city construction. While continuously introducing and improving relevant laws and policies, the government has increased financial investment, formulated information technology research and development frameworks, guided the development of related industries, focused on cultivating information security talents, proposed effective solutions for information security and supervision of smart cities, and continuously updated and improved relevant standards

for smart cities, guiding the evaluation of smart city construction in various regions, laying a solid foundation for accelerating the promotion and application of standards and deepening cooperation. In the same year, the Ministry of Science and Technology issued the "Guidelines for the Construction of National New Generation Artificial Intelligence Innovation and Development Pilot Zones (Revised Edition)", which further clarified the overall requirements, key tasks, application conditions, construction procedures, and safeguard measures of the national new generation artificial intelligence innovation and development pilot zones, and systematically promoted the construction of the national new generation artificial intelligence innovation and development pilot zones. Reduce intervention in segmented fields, delegate corresponding information services to the market, and promote the development of related fields. Actively developing and stabilizing the market dominated by smart city construction, promoting industrialization and marketization in related fields, will have a direct effect on improving the development level of smart cities. After having relatively complete information infrastructure in various regions, market enthusiasm is high, and industries such as artificial intelligence, intelligent manufacturing, and smart elderly care have developed rapidly, which helps to strengthen the integration of government information resources and accurate prediction of public demand, further promote the construction of smart cities, improve public services and social governance levels.

It can be seen that during this stage, policies have focused on providing corresponding support and guarantees for the development of smart cities in various fields, while further improving the relevant standard system. As significant progress has been made in the development of social informatization and digitization, more attention has been paid to the requirements and norms of information security, and corresponding supervision and management have been gradually strengthened.

3. THE EVOLUTIONARY LOGIC OF CHINA'S SMART CITY DEVELOPMENT POLICIES

3.1. Economic Environment

In 2017, the 19th National Congress of the CPC put forward the expression of "high-quality development" for the first time, indicating that China's economy has shifted from a stage of rapid growth to a stage of high-quality development. The establishment and improvement of a green, low-carbon, and circular economic system proposed in the report of the 19th National Congress of the Communist Party of China has pointed out the direction for high-quality development in the new era, and also raised an extremely important issue of the times.

Smart cities rely on high-tech industries to achieve a high degree of integration between the economy, culture, society, people's lives, environment, and government in the city. Therefore, the construction of smart cities may promote high-quality economic development from government management, industrial structure optimization, and other aspects. In the construction of smart cities, it is necessary to rely on developed intelligent systems and information systems to improve the basic infrastructure level of the city. At the same time, the construction of intelligent systems can enhance the government's management capabilities. Based on this, the government's macroeconomic regulation is more effective, social welfare is more targeted, ecological environment improvement is promoted, and the mechanism for sharing development achievements is improved, thereby promoting high-quality urban economic development. Technological independence and self-improvement are the key to high-quality economic development. Smart cities rely on high-tech information technologies such as the Internet of Things and big data. In the construction of smart cities, new information technologies are constantly developed and applied, thereby improving social production efficiency and driving high-quality economic growth in cities. Smart cities promote the continuous optimization of industrial structure by improving traditional enterprises and developing emerging industries, thereby providing new growth points for urban development and driving high-quality economic

growth. On the one hand, the penetration of emerging technologies into traditional industries promotes the improvement of product production efficiency for traditional enterprises, accelerates product updates and iterations, and ultimately leads to high-quality operational efficiency for traditional enterprises. On the other hand, the establishment of smart cities relies on emerging information technologies such as the Internet of Things and cloud computing. This kind of emerging information technology will drive the development of information services, software, Internet technology and other service industries. These low consumption and high-tech industries will accelerate the optimization and upgrading of the urban industrial structure, thus driving high-quality economic development.

The demand for further development of innovative enterprises has promoted the development of smart cities. As early as 2010, the State Council of China put forward clear requirements for the construction and development of innovative industries. It is necessary to improve the development level of the industry at the level of the Internet, cloud computing and smart terminals. In this social context, the development space of industries such as Internet of Things technology, big data technology, and cloud computing technology for building smart cities has been further expanded, and the scale of industries has also been effectively expanded. In recent years, the Internet of Things and other related industries have developed rapidly, and relevant government departments have also formulated strategic development plans related to the Internet of Things, clearly stating the need to further build an industrial system related to the Internet of Things, establish an industrial chain related to the Internet of Things, build more complete demonstration projects for the construction of Internet of Things regions, and strengthen the deep cultivation of small and medium-sized Internet of Things enterprises. Therefore, further strengthening the construction of smart cities can promote the stable development of these emerging industries, adjust the industrial structure, form new economic growth points for cities, and promote continuous progress in Chinese society.

3.2. Development Philosophy

With the deepening of construction, the development concept of smart cities is also being adjusted in a timely manner. In the early stages of development starting from 2008, various regions independently carried out smart city construction and emphasized the key role of infrastructure and technological support. At this time, policy themes were mostly focused on the field of information infrastructure construction. In 2012, with the development of informatization and the advancement of related work, the central government gradually attached importance to smart cities and began to coordinate top-level design planning. The development concept during this period mainly focused on planning the field of smart applications, building a standard system, exploring various models and development paths of smart cities through extensive pilot projects, and emphasizing the integration of new technologies such as big data and the Internet of Things with urban governance through smart city construction. Thus, the concept of smart city development has become a national strategy at a high level and has been expanded and extended in breadth, focusing on top-level development planning, pilot exploration, and the integration of new technologies and urban governance.

By 2017, the construction of smart cities had achieved initial results, and after the information infrastructure was relatively complete, the focus gradually shifted to the improvement of intelligent urban public services, the development of smart industries, the improvement of standard systems, risk prevention and control, and other soft environment fields. The concept of new smart cities and smart societies also emerged. From the perspective of the transformation of the development concept of smart cities in China, there is a shift from simple to comprehensive, from local autonomous development to central coordinated planning, and from focusing on information infrastructure construction to building a smart soft environment. In general, the strategic goals, support objects, and support methods for the development of smart cities have provided guiding requirements for the role positioning and behavioral choices of various government departments in the development of smart

cities with the continuous deepening of social, economic, technological, and urban construction, laying the institutional foundation.

In March 2016, the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China put forward five development concepts of "innovation, coordination, green, openness and sharing". In April of the same year, General Secretary Xi Jinping proposed to promote the construction of a new smart city by classification at the National Symposium on Cybersecurity and Informatization Work, and pointed out that "China's cyberspace represents a new productive force, a new direction of development, and should also be able to take the lead in implementing the new development concept."

The five development concepts have pointed out specific directions and practical paths for the construction of new smart cities, namely, using innovative mechanisms as the focus of new smart city construction, green coordination as the core goal of new smart city construction, and openness and sharing as the basic principle of new smart city construction. In the process of establishing the five development concepts, the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China creatively put forward the development idea of "putting the people at the center". The correct path to adhere to the "putting the people at the center" idea is to implement the five development concepts well. The five development concepts are the specific path and practical form of practicing the "putting the people at the center" idea, and the "putting the people at the center" idea is a red line that runs through the five development concepts, highlighting the clear demands and orientation of the people's livelihood.

3.3. Technical Level

With the development of information technology, especially the emergence of the middle platform concept, smart cities have also begun to move towards platformization in technology, while also promoting a complete transformation of the information technology development model of decentralized construction and management of various departments in cities. Local governments have begun to integrate information technology construction forces and form a unified information technology talent platform for cities.

Since 2014, some local governments have started to establish specialized agencies to coordinate the construction of government big data and digital government. In 2018, in the new round of self selected projects of institutional reform, many provinces have chosen such institutions as a breakthrough point for reform, and have successively established such institutions as Big Data Development Administration, Government Service Data Administration, and Big Data Coordination Bureau to try to solve the problem of local governments' governance of big data for many years, so as to improve the efficiency of data resource development and utilization and the level of "Internet+" government services. Guangdong Province has gone the farthest, abolishing all information technology institutions within government departments, transferring administrative management functions to specialized digital government management departments, and transferring technical operation service functions to mixed ownership enterprises jointly funded by state-owned telecommunications operators and industry leaders, forming the Guangdong model of "government enterprise collaboration and management operation separation". In recent years, many places have also begun to pilot such models. In terms of technology, relying on the advantages of local large-scale Internet enterprises, the construction of local digital government has put forward the concept of platform. For example, Guangdong Province has proposed a new intensive construction model of "big platform, small front-end, and rich ecology"; Alibaba, as a system developer, has proposed the technical concept of "government service platform" around the Zhejiang Provincial Government Service Platform. New concepts such as "urban brain", "digital base", and "twin city" are beginning to be widely accepted, which will bring new construction content to the construction of smart cities.

The pace of data sharing is constantly advancing. By the end of 2020, the national integrated data sharing and exchange platform will be established, and the speed of open sharing of government data, public data, government enterprise data, and enterprise data will accelerate:

- 1) Government data sharing: 62 central departments and 32 provincial-level localities have fully integrated into the national data sharing system, with a total of over 1300 data sharing service interfaces released.
- 2) Public data openness: The basic establishment of provincial-level public data openness platforms has been completed, and specialized local government regulations have been issued in Shanghai and other places. The orderly promotion of public data openness is underway.
- 3) Government enterprise data sharing: The specific transformation of government enterprise data sharing is from government led to government cooperative. The first type is to build government enterprise data sharing platforms (Liaoning, Nanjing); The second category is government data authorization operation (Chongqing, Shandong, Beijing)
- 4) Enterprise data openness: The purpose of enterprise data openness is to realize commercial value, and the data openness at the enterprise level is mainly market-oriented behavior.
- 5) Institutional rules and security system construction: In December 2020, the China National Intellectual Property Administration issued the Guidelines for the Use of Intellectual Property Basic Data. All regions have studied and formulated institutional rules to promote the opening of government data sharing, the development and utilization of data resources, and the integrated data sharing response mechanism has become increasingly perfect.

4. SUMMARY

Using the analytical framework of historical institutionalism, this paper reviews the historical evolution of smart city development policies since the concept of "smart city" was proposed, revealing its phased development from the initial exploration stage to the standardization stage. At the same time, it discusses the structure and historical logic of institutional evolution, which is of positive significance for a comprehensive understanding of the historical changes and future paths of smart city development policies. Based on the institutional evolution logic in the framework of historical institutionalism analysis, we can make the following future prospects:

The development policies of smart cities need to improve the construction of laws and regulations to maintain information security. Internet of Things, big data and other network portals, as well as account information, are essential production factors for optimizing smart project construction. Along with the development of network information technology, it has also brought huge hidden dangers to data security, adding new security risks to the construction of smart cities in China. To ensure information security, the government needs to establish and improve information security protection systems. In the era of informatization, the country needs to improve laws and regulations in the field of information security. Based on this, municipal governments need to implement and improve information confidentiality systems, and clarify the importance of information confidentiality through laws and regulations. We will launch a heavy crackdown on illegal activities such as smuggling and falsifying data by cracking down on illegal individuals who sell data and information without authorization. The central and regional governments should simultaneously enhance information transparency, utilize technologies such as big data, cloud computing, and the Internet of Things to improve the ability to obtain official data information, open up information for free, provide necessary data information for enterprises and individuals, and severely crack down on criminal activities such as illegal data theft and fabrication of false information.

The development policies of smart cities need to guide more market entities to participate. The construction of new smart cities is a systematic project. Although the construction and development

of new smart cities is a project guided by the government, emphasizing public participation, promoting government enterprise cooperation, and encouraging multi-party joint construction, the investment subject of smart city construction in China is still relatively single, mainly relying on government investment. Due to the fact that many projects in the construction of new smart cities are public welfare livelihood projects with large investment amounts, long recovery cycles, high investment risks, lack of operability, and insufficient attractiveness to social capital, they mainly rely on fiscal funds for operation, resulting in excessive financial burden for the construction, operation, and maintenance of smart cities, exceeding the government's financial capacity, and limiting the sustainable development of smart cities.

The development policies of smart cities must break away from path dependence. The construction mode of smart cities should be tailored to the actual situation of each city. To build smart cities faster and better, local governments must first not blindly follow the successful construction models of other cities, nor be complacent. They should be good at focusing on the characteristics of urban development and the needs of the people for service functions, finding key breakthroughs in economic development, and formulating policies and guidelines for urban development and construction according to local conditions. Secondly, local governments should assist in promoting and supporting the construction of smart cities, in order to break through regional limitations and further expand the sources of project construction funds. Finally, the finance department should strengthen its financial support for the digitalization and informatization construction of municipal level institutions and social enterprises, and contribute to the further construction of smart cities.

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