The Construction Logic and Limits of Urban Technology Governance: An Analysis Centered on Smart Cities

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Abstract: Information is the basis of governance; information technology is an important tool to achieve the transformation of governance method. With the in-depth application of information technology, new forms of technology governance are constructed. This study takes the smart city as the research object and explores the basic logic of technology governance. Technocracy includes four dimensions of information, relationship, power and concept. Smart cities comprehensively apply advanced technologies in urban governance, including basic technology perception, information technology connection, organizational technology calculation, knowledge technology research and evaluation as well as intelligent technology application. Technology governance embedded in urban governance is the result of the specific economic logic, political logic, value logic and operational logic. Now the technological governance has achieved remarkable results. But it faces the limitations of institutional mechanisms, governance costs, information sharing and technology integration. Technologies and systems empower each other, which improves the governability of cities. But we also need to guard against technological hegemony and its negative consequences.

1. Introduction

The concept of technocracy firstly appeared around 1919. It is a combination of the Greek words techne (technology) and kratos (power). It means a government made up of technicians, or the state which hires technical experts to manage the society. In the 1930s and 1940s, a famous technological governance movement broke out in the United States. The concept of technological governance has been widely disseminated and widely used in public governance. With the development of industrialized society, technology has become a more and more important participator in political decision-making. At present, technology governance has become the most important and obvious trend in social governance and political activities all around the world. [1]

2. Technocracy in Modern Urban Governance

In a highly urbanized society, the application of information technology is changing with each passing day. From digital city to smart city, the rise of technocracy coincides with the demand of urban governance. According to our understanding, the connotation of technocracy in modern urban governance should include four dimensions.

The first dimension is information. Information is the basis of urban governance. As Toffler said, information is the terminal amplifier and the key to power transfer in the future. Information resources are the basis of governance. National governance should be carried out based on obtaining necessary information about social facts. Through national authentication, remote sensing information, video image surveillance, personal network information tracking and other technologies, modern society can transcend the limitations of urban time and space, and obtain a large number of diverse data information with low value density, which stimulates the exploration of “making decisions based on data, managing through data and innovating on the basis of data”. The information base of municipal governance can become clear and more abundant. [2]

The second dimension is relation. The mechanism of urban technological governance is to put the technological system on the concrete problems of social and economic life and the existing

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administrative system without losing its affinity with the grass-root class. It can be regarded as a beneficial complement of the hierarchical system, which is conducive for urban administrators to deal with urban problems scientifically and timely. The continuous technicalization of governance can improve the administrative system's sensitivity and resilience to specific social problems.

The third dimension is power. In a technocratic society, the distribution of knowledge defines two kinds of people: experts and the rest. Experts have the power while the mass has no power. Habermas describes a technocratic society in which science and technology become increasingly sophisticated and mathematical, and the society itself becomes increasingly complex, resulting in more and more complicated economic and administrative skills. An increasingly number of technical experts should be introduced to serve the state and the big bureaucracy; the decision-making process is increasingly dependent on sophisticated technical analysis and design.

The fourth dimension is concept. As Foucault said, technology is not only a tool, or a means to achieve goals. On the contrary, it is a political actor. Means and objectives are inseparable. [3] The essence of technocracy is an ideology. Because of the practical attribute of science and technology, it skillfully avoids the traditional political category. But it projects scientism into the political sphere in the name of technology.

3. The Operational Mechanism of Technology Governance in Smart Cities

Essentially speaking, governance is a task response process achieved through the governance subject's reorganization. It is a cross-sectoral process. Overall speaking, as the epitome of technology governance, the smart city is a governance mechanism with Chinese characteristics. It runs on the existing urban structure and mechanism of upward management by the help of virtual reality technologies.

The process involves several techniques; the first one is basic technology perception. Smart cities need the comprehensive and thorough information obtained through sensors of city skin, which requires the continuous accumulation of large-scale, complex and constantly changing data sets. [4] At the same time, it is necessary to capture the key dynamic information. The development of embedded technology makes it possible. For example, the cloud retrieval technology can not only automatically extract the features of images and videos, but also extract and index behaviors like running, clustering and wandering. [5]

The second one is information technology connection. Information connection includes two aspects. One is the interconnection between processing centers and information terminals, in order to ensure the timely processing and application of different types of information. The processing and integration of station monitoring data and information perceived by RFID readers through processing centers are examples. The other is the connection between different types of databases and data platforms. Urban operation can realize visualization, controllability, intellectualization, predictability, quantifiable evaluation and continuous optimization.

The third one is organizational technology calculation. The cloud server is the hub of data processing in the whole intelligent bus cloud platform. It can meet the needs of data storage, data management, spatial analysis, prediction analysis, data mining and so on. Data analysis and data mining are very important. The algorithm is the rule. It does not only establish the goal that the machine tries to achieve, but also point out the path and method to achieve the goal. [6] The Data Fusion technique calculates data and information from various data sources according to established rules, such as the fuzzy algorithm, the decision-making tree algorithm and the genetic algorithm. The processed data are then analyzed and summarized to generate complete, accurate, concise and comprehensive information.

The fourth aspect involves the knowledge and technology research and judgment. The development of data storage and computing technology, especially the cloud storage and cloud computing technology, has promoted the progress of smart cities. Now the speed of cloud computing is 10 trillion times per second, which can provide possibilities for intelligent scheduling, route site optimization, passenger flow prediction and emergency response.

The fifth is the application of intelligent technology. The construction of smart cities aims to

meet people's needs. The transformation from intelligent technology to intelligent function is the way to achieve this goal, that is, the functionalization of intelligent technology.

4. The Multi-reconstruction Logic of Urban Technology Governance

With the rapid development of smart cities, projects about smart transportation, smart medical care, smart pension system and smart finance have been launched in succession. They break the restrictions of urban space and time, bringing great and far-reaching changes to the production, life, management and service in cities. So, how can the technology be constructed step by step and play an important role in urban governance? How did it become ubiquitous?

The urban technological governance has economic logic. At the level of social development, the research and development of technology should be profiTable in the end. Ellul believes that it is not the economic law that imposes itself on technological phenomena, but the technological law that commands, directs and amends the economy. [7] The construction of smart cities is the realistic need to promote economic development. In the future, smart cities will bring about nearly 5% of the overall economic development every year, which is equivalent to nearly 20 trillion US dollars in 10 years. The investment and construction of smart cities will greatly promote the rapid development of economy and society.

The urban technological governance has political logic. The political value of technology determines that urban technological governance is not only a technical issue, but also a political one. At present, the construction of smart cities in China is led by governments. On one hand, the government plays a leading role in the investment and operation of smart cities; on the other hand, the political support of "top leaders" decides the level of smart city development. [8] They introduce technology into urban governance is not only because technology can solve problems in urban development. More importantly, it is conducive to strengthening the governance power. First, it can increase the power of government administration. Strengthening the monitoring of social operation by means of technology can maintain the stability of urban society and realize the controllability and anticipation of governance. Second, it can strengthen the controlling power of the government. Third, it facilitates the power coordination of urban departments. Internet technology strengthens the links between various departments of city governance and realizes the sharing of information resources. The linkages between departments are the requirements of better urban governance. The construction of smart cities reduces the cost of inter-departmental coordination.

The urban technological governance has value logic. In essence, value means the significance of human's own objective activities and their consequences on human's survival and development. The value of technology is the significance of technological activities and their results on the survival and development of the main body of technological practice. Technology not only plays an important role in transforming nature, but also provides strong impetus in promoting social development and progress. Smart city is not only a good medicine to solve urban problems, but also an important measure to promote the economic development, the urbanization process and the building of a well-off society in an all-round way.

The urban technological governance has operational logic. Technology is pushed forward by its inherent strength and accelerates self-growth irreversibly by geometric series. At the same time, technology can be superimposed on each other. To obtain a technology requires a certain number of other technologies. The new generation of information technology is deeply integrated with urban modernization. The construction of smart cities has mature software and hardware conditions. In addition, the foreign experience on smart city construction can be used as reference. Cities can learn from each other and follow each other. The practice of urban technology governance centered on smart city is developing in full swing.

5. Limitations of Urban Technology Governance

Technological governance helps to improve people's livelihood, reshape governance patterns, and solve some problems of urban development under the new normal. However, there are some

limitations in technological governance.

The technological governance has limits of institutional mechanisms. Under the condition of low complexity and low uncertainty, the relative stability of institutions and rules will reduce the uncertainty of behaviors. Institutions and rules guide collective actions effectively by maintaining the order. Under the condition of high complexity and high uncertainty, however, the stickiness and inertia of the system make the execution of systems and rules unable to adapt to the changing environment, thus highlighting the restriction of the system on actions; the guiding role of the system on actions is gradually weakened. Urban technology governance is embedded in the existing political system. Virtual technology cannot be perceived easily. To a large extent, technology application is restricted by the political system.

The technological governance has limits of governance costs. The smart city is a huge and complex system engineering high technology content and long-time span. It also involves a wide range of resources. To ensure the normal operation of urban technological governance, it needs extremely high operating costs, information costs and decision-making costs. Cost is the main obstacle to the promotion of smart cities. [9] In the construction of smart city, the government attracts social capital through subsidy or other means. However, from the actual results, though smart city has achieved certain results in the fields of urban transportation and medical treatment, the achievement is far from the expected results. Under that situation, social capitals tend to hold back or escape from smart city projects, resulting in the shortage of funds. Once the government subsidy is terminated, the life of the system will be over. Adequate funds are the prerequisite for the implementation of urban technology governance.

The technological governance has limits of information sharing. The problem of information isolated island is the bottleneck for the development of smart city. The lack of information sharing often makes smart cities remain in name only, and even causes serious consequences. Long-standing management problems and system problems cannot be changed immediately with the construction of smart cities. They need the close cooperation of various departments. These problems can only be solved through the coordination and cooperation of ideologic, systematic and management methods.

The technological governance has limits of technology convergence. Data fusion is a bottleneck in the process of large data application and intelligent decision-making. The concept of fusion began in the early 1970s, when it was called as multi-source correlation and multi-component synthesis at that time. Now it is often called as information fusion or data fusion. It refers to the process of collecting and integrating various information sources, multimedia and multi-format information to generate complete, accurate and effective integrated information. The existing data fusion technology has inconsistent open interfaces, so the data interconnection cannot be achieved.

The technological governance has limits of information utilization. In the past, we needed to learn how to survive in the environment lacks data. Now we need to learn how to survive in a data explosion environment. Hegel said, we can see nothing in pure light and in pure darkness. Decision-making in the environment of data explosion is as difficult as decision-making in the environment lacks data. Data mining tools cannot guarantee that useful rules can be excavated. The utilization rate of big data in China is only 0.4%. The levels of information resources development and utilization are low; the data mining is inadequate. The transformation rates of information knowledge to products, assets and benefits are also slow.

6. Conclusion

To sum up, technocracy is essentially an ideology. The introduction and utilization of science and technology in modern urban governance are the ineviTable result of the rapid development of science and technology, as well as the inherent requirement of urban governance innovation. The application of technology can improve the efficiency of urban governance in all aspects and realize better governance. However, it must be noted that technology is not isolated; its application is also a political action. Technology is also a political actor. Technology governance redistributes power. It empowers engineers and programmers, weakens the management power of the government and

citizens, and leads to a new pattern of the game of power. With the application of science and technology in more areas of urban governance, we should keep alert to technological supremacy, prevent technology bureaucracy from grabbing all powers, and avoid the excessive manipulation of technology. Urban governance should adhere to the principle of laying equal stress on technology and system, abide by the laws of urban development, respect the diversity of cities, and coordinate the soft and hard resources of urban governance, so as to better conform to the trend of technological governance development.

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