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# Research on Cognitive Pattern of the Concept of Smart City with Crawler Technology

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**Abstract:** Smart city is a new form of information city and digital city and a new type of innovative means of planning and management of city, its theoretical research and construction practice have entered a period of rapid development. In-depth understanding of concept related to smart city will contribute to avoid the one-sidedness and blindness of smart city construction. This paper collects and analyzes social media data by means of network crawler technology. Then, we build the cognitive model of the concept of smart city by using e-commerce portrait technology, and discusses definition and information label of smart city. Finally, the technology-based smart city and the sustainable smart city are compared and analyzed by using the cognitive model of the concept of smart city. The purpose is to provide revelation for the future development of smart city.

**Keywords:** concept of smart city, Internet of Thing, complex system, cognitive pattern, social media, crawler technology, portrait technology

## 1. INTRODUCTION

With the technological progressing and rapid urban developing, urban population expansion, traffic congestions, environmental pollution, energy scarcity and many other urban diseases are coming up. “Smart City” concept has been proposed, immediately in many countries and regions in the world has been widely recognized and widely accepted. In the initial stage, whether it is the academic research or the practice of government behavior, the smart city construction achieve the city to improve operational efficiency with information technology, most of smart city concept in that time is technology-oriented, focusing on the hard strength of urban construction. Later, with the concept of smart city developing, the attention shifted gradually to the sustainable construction of the city and focus on the soft power of urban construction. In recent years, smart city evolved into a label behavior of the city, that is, to hype the concept of smart city, while often ignoring the connotation and essence of the concept. In order to clarify the latest developments and research trends of the concept of smart city, provide the deep analysis and method comparison in this field, and look forward to the future of the most valuable research direction and key issues, this paper establish the cognitive model of the concept of smart city, and then promote the concept of smart city research method of cutting edge explore.

The cognitive model of the concept of smart city in this study mainly apply the social network crawler technology and literature analysis and other methods, searching the public’s views about the cognition of the concept of smart city from the network media and data perspective, trying to build a cognitive model of the concept of smart city with e-commerce portrait technology. That is, the labeling of the concept of smart city is a virtual representative of the public true understanding on smart city, and is the conceptual model of smart city based on a series of data. The cognitive model of the concept of smart city extracts one or a kind of smart city concept cognition label, and carries on the structural treatment to the concept of smart city with the social attributes, technical support and key words of smart city. The purpose is to elaborate positioning of the characteristics of the construction of smart city. This paper abandon the traditional subjective cognition of the

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concept of smart city and establish the cognitive model of the concept of smart city from the network media and data perspective for the purpose of better and more comprehensive understanding the connotation and extension of the concept of smart city. The practical significance of this paper is contributed to understand the real needs and direction of development of the construction of smart city, and provide fully understanding of differentiated characteristics of the concept of smart city for the related participate in the construction of smart city.

This paper is organized as follows: section 2 is literature review, section 3 is research methods, section 4 is data acquisition, section 5 constructs the cognitive model based on portrait technology, section 6 analyzes the cognitive model of the concept of smart city, and section 7 is the conclusions.

## **2. LITERATURE REVIEW**

### **2.1 Concept of smart city**

The Smart Earth first proposed by IBM is embed and equipped the sensor into the power grid, railway, bridge, tunnel, highway, building, water supply systems, dams, oil and gas pipelines and other objects, all of them connected each other, forming the so-called “Internet of things”, and then integrates the “Internet of things” with the existing Internet, to achieve the integration of human society and physical systems <sup>[1]</sup>. After that, IBM becomes a pioneer in smart city research.

The French scientist Joseph Sifakis, the winner of Turing Prize in 2007, says that systems are things-interconnected (most of things can be measured, sensed and monitored in the country), interconnected (people and objects can communicate and contact with each other in new ways) and intelligent (enhanced the predictability of event and optimizing the usage of resource) <sup>[2]</sup>. This shows the arrival of the smart times, smart city will become a hot topic for many researchers.

### **2.2 Smart city from the perspective of technology practice**

Many companies explain the concept of smart city from the perspective of its service technology for the city. The foundational concepts of smart planet by IBM are instrumented, interconnected, and intelligent. Instrumented refers to sources of near-real-time real-world data from both physical and virtual sensors. Interconnected integrates those data into an enterprise computing platform and the communication of such information among the various city services. Intelligent refers to the inclusion of complex analytics, modeling, optimization, and visualization in the operational business processes to make better operational decisions <sup>[3]</sup>. Huawei focuses on infrastructure construction for smart city. Huawei identifies that smart city refers to the use of new ICT means to sense, analyze, integrate all the key information of urban operation and management system, and intelligent response to the various needs of the city governance, livelihood services, business activities, driving the development of the city with data, and creating information-based urban life <sup>[4]</sup>. But we interpret the concept of smart city from a network perspective.

With the passage of time and the practice of smart city, Chinese researchers understand the concept of smart city has become increasingly clear. Li et al. say that smart city is built on the basis of digital city framework, through the ubiquitous sensor it will be associated with the reality of the city, store, compute, analyze the massive data and decision-making by the cloud computing platform processing, decision-making results apply to a variety of facilities for automated control, more concise statement is “smart city = digital city + Internet of things” <sup>[5]</sup>. Yang describes that smart city is a new generation technology of Internet, cloud computing, data analysis and other, the city will run the various core systems integrated into a large platform, implanting the concept of smart in order to better understand and control the city operations , and optimize the resource utilization of city <sup>[6]</sup>.

### 2.3 Smart city from the perspective of sustainable development

The European Union defines smart city as: not only focus on the development of information and communication, smart city also promote the application of knowledge services on the basis of perfecting social infrastructure, and improve resource utilization through intelligent management, To promote the sustainable development of the city for the public to create safe, green, efficient and sustainable of city life. A smart city is a city well performing in a forward-looking way in six characteristics: smart economy, smart people, smart governance, smart mobility, smart environment, smart living<sup>[7]</sup>. Most research of smart city in Europe focus on ecological protection and energy conservation, and the study of smart city in China more focused on accelerating urban economic development to improve people's basic living standards.

The research of smart city in China is not as specific and in-depth as the study in foreign. Xu et al. point out that the concept of smart city is a integration of digital city, knowledge city, eco-city, created city and innovative city, integrated urban functions of the above concept and override the integrated body, smart city tries to realize the sustainable economic, social and ecological development of the city by means of information technology<sup>[8]</sup>. Xiong et al. identify that smart city, supported by information technology, can improve urban operation and management efficiency with sound, transparent and full information access, smooth, extensive and safe information sharing and effective, standardized and scientific information utilization, improve urban public services, enhance the ability to deal with emergencies, so that the city become a green carrier of government, enterprises, the public efficient management, production, life<sup>[9]</sup>.

### 2.4 Research challenges

Reference 10 illustrates the smart city follows as<sup>[10]</sup>: (1) Many cities in Asia, Europe, and North America are pursuing smart city projects. (2) A smart city is a complex system, meaning even a single vulnerability could affect all citizens' security. (3) Future research must address high energy consumption, security, privacy, lack of investment, smart citizens, and other related challenges to enable secure, robust, scalable smart city development and adoption.

This paper discusses the concept of smart city in the most public's view, focuses on big data in network media to better understand the concept of smart city. Reference 11 illustrates big data technical challenges as follows<sup>[11]</sup>: (1) Big Data is revolutionizing all aspects of our lives ranging from enterprises to consumers, from science to government. (2) Creating value from Big Data is a multistep process: Acquisition, information extraction and cleaning, data integration, modeling and analysis, and interpretation and deployment. Many discussions of Big Data focus on only one or two steps, ignoring the rest. (3) Research challenges abound, ranging from heterogeneity of data, inconsistency and incompleteness, timeliness, privacy, visualization, and collaboration, to the tools ecosystem around Big Data. (4) Many case studies show there are huge rewards waiting for those who use Big Data correctly.

In summary, a universal fixed concept may be difficult to define with the variety of characteristics of smart cities worldwide. We search for a more holistic concept of smart city from the perspective of network media and data, by means of establishing the cognitive model of the concept of smart city with the portrait technology of e-commerce.

## 3. RESEARCH METHODS

Minqing Hu and Bing Liu performs mining and summarizing customer reviews in three steps as follows<sup>[12]</sup>: (1) mining product features that have been commented on by customers; (2) identifying opinion sentences in each review and deciding whether each opinion sentence is positive or negative; (3) summarizing the results.

Web crawler technology is known as Web spider. The software automatically crawl web information on the Internet. The principle is to capture the corresponding fields and data automatically according to the acquired

destination URL by configuring the link list and the rules of the crawl module, stop the data collection process until the configured termination conditions are met. Web crawler is divided into general network crawler and focusing network crawler. First of all, the cognitive model of the concept of smart city to get the news data of the Smart City Forum, the news data of the Smart City Forum mostly comes from the headlines of the news on the Internet. The news information records a series of dynamic data from the public browse, search, click, jump the relevant information of smart city in the Smart city Forum. We can also use the Web crawler technology to track the key words information of the cognitive concept of smart city, and improve the cognitive pattern of the concept of smart city.

The logic of concept cognition summarization is illustrated in Figure 1. The inputs to the system are an entry Web page for all the news of smart city. The outputs are the summary of the concept cognition as the follow shown in the section 5.

The system performs the summarization in four main steps: (1) mining the key words of smart city that have been commented on web pages, given the inputs, the system first downloads (or crawls) all the web pages, and put them in the key words database; (2) counting and pruning key words and deciding whether each concept is related or unrelated, finding those “hot” (or frequent) related concept that many news have expressed their key words on; (3) categorizing and sorting the related concept of smart city, the system then finds those unrelated concept based on the extracted concept words. The concept cognition are categorized according with the resulting related features, and concept orientations of smart city are sorted with the help of the mentioned quantity; (4) summarizing the results, the concept cognition of each web page of smart city is identified and a final summary is produced. Note that concept tagging is the part-of-speech tagging from natural language processing, which helps us to find related concepts.

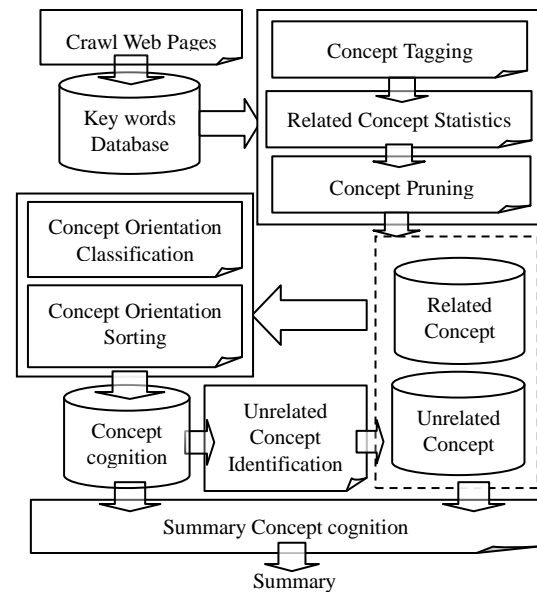


Figure 1. Concept cognition summarization

#### 4. DATA ACQUISITION

This paper finds the hot news in the front page of smart city from the China Smart City Website by the use of common Web crawler, designates <http://www.cnsn.com.cn/news> for the collection site, and the overall process shown in Figure 1. We get the URL of the initial web page from one URL of the web page of the China Smart City Website starts, extract the new URL from the current page and put it into the queue. After capturing the candidate web pages, we parse its title, text, keywords, times, web page source field. Useless information of advertising information, navigation information and some other things are filtered by the intelligent filtering function of software, and the automatic page turning is set until the certain termination conditions of the system are met. Finally, 2000 data are obtained, and then the data are filtered and cleaned, and 1449 valid web pages with key words are obtained. After data preprocessing, the integrated data warehouse contains 1641 keywords, and the descriptive statistical analysis of the data is carried out. This paper mainly carries on classified data statistics, sorting the statistical results, selecting the most discussed conceptual tag of smart city as the training data, starting the next data mining work, and then extracting the cognitive model data tags of the concept of smart city according to the key words lexicon of smart city.

## 5. CONSTRUCTION OF THE CONGNITIVE PATTERN BASED ON PORTRAIT TECHNOLOGY

The conceptual cognition of smart city provided by the headline and front page of China Smart City Website is divided into four aspects: technical support, policy assurance, economic and industrial development, public management and service. Headlines data in China Smart City Website are crawled through the network crawler, including the title, text, keywords, number of visits, time, web source and other fields of web pages. The results of the crawling are sorted, classified and counted according to the labels of the conceptual cognitive pattern, and the number of references to various keywords in the cognitive pattern labels of the concept of smart city is obtained (see in table 1). Ranking the top five technical support labels in the cognitive pattern of the concept of smart city are the Internet of Things, big data, Internet, Internet plus and network information security; ranking the top five assurance policy labels in the cognitive pattern of the concept of smart city are new-type urbanization, development pattern and direction of smart city, national strategy, e-government, pattern innovation and institutional reform of smart city; ranking top five economic and industrial development labels in the cognitive pattern of the concept of smart city are information consumption, intelligent manufacturing, technological innovation, manufacturing with Chinese characteristics, and industrial transformation; ranking top five concepts of public management and service labels in the cognitive pattern of the concept of smart city are livelihood issues, ecological civilization and green, smart community, smart green and smart traffic.

**Table 1. Cognitive pattern labels of the concept of smart city**

Cognitive pattern labels of the concept of smart city							
Technical support		Policy assurance		Economic and industrial development		Public management and service	
Keywords	MQ*	Keywords	MQ	Keywords	MQ	Keywords	MQ
Internet of Things	246	New-type urbanization	208	Information consumption	52	Livelihood issues	22
Big data	140	Development pattern and direction	111	Intelligent manufacturing	38	Ecological civilization and green	15
Internet	66	National strategy	47	Technological innovation	24	Smart community	14
Internet plus	60	E-government	31	Manufacturing with Chinese characteristics	22	Smart green	14
Network information security	37	Pattern innovation and institutional reform	26	Industrial transformation	19	Smart traffic	13
Broadband construction	36	Pilot work of smart city	25	Economic development	16	Smart endowment	11
Cloud service	34	Prospect and trend of developing	24	Agricultural information	14	Urban diseases	10
Information system	29	Ministry of Industry and Information Technology	19	Industrialization and information fusion	14	Smart governance	9
ICT industry	29	Data resources integration and open	17	Industrial transformation and upgrading	12	Smart education and talent	9
Sensor technology	18	Industry 4.0	13	Market competition	11	Sustainable new energy	8
GIS Smart systems	6	Thirteen five-year plan	12	Smart industry	9	Smart Home	7
Robot	6	Standard system	12	Financing pattern	7	Smart Healthcare	6
3D Print	3	Information Open	12	Financial reform	6	Smart tourism	6
Total	681	Top-level design	10	Modern service industry	2	Smart Power grids and water	4
		Financial assurance	7	GDP proportion	2	Smart logistics	2
		Total	562	Total	248	Total	150

\*MQ is Mentioned quantity

Technical support perspective: the mentioned quantity in public's cognition of the concept of smart city is the largest amount. Sensing technology has been everywhere in the life of people, sensor technology provides technical guidance and assurance for smart city to realize Internet of Things. Internet of Things enhances the public life experience, involves intelligent home, road network monitoring, intelligent hospitals, personal health and digital life and other fields. Big data analysis predicts the economic conditions of city, infers the quality of life of urban citizens, extracts the repetition rules of citizen behavior to predict crime and warn epidemiological,

and improves the road design by the rules found in traffic accidents and irregularities data. Big data can also better detect public opinion<sup>[13]</sup>. Information systems and broadband network construction also played a role in promoting the construction of smart city. The development of cloud services provides an advanced application service solutions for smart city. The construction of smart city can't depart of the support of cloud services. Cloud computing with strong data analysis capabilities will become the "brain" of smart city. Cloud services powerfully support the huge system of smart city to operate efficiently, safely and steadily by storing and calculating massive data, safe and stable operation. The emerging GIS intelligent systems, robot and 3D printing speed up the pace of intelligent living. In short, these technologies provide a solution for smart city.

Policy assurance perspective: the public awareness of the concept of smart city is focused on new-type urbanization and the development pattern and direction of smart city. Integrating multimedia, human factors, user-centered system methodology, and design principles, smart city can provide solutions to many sustainability problems, but their cohesive development requires an effective policy to be in place as part of any solution<sup>[14]</sup>. Smart city began to layout from the national strategy, and gradually carry out the pilot work of smart city, provides financial and funding protection mechanism to accelerate the process of urbanization in central and western regions. Policy assurance promotes the construction and development of smart city, combining the theory and practice of smart city, providing a more accurate pattern and direction of development for smart city. Of course, the construction of smart city also requires the government to integrate data resources and provide information to the public open and data.

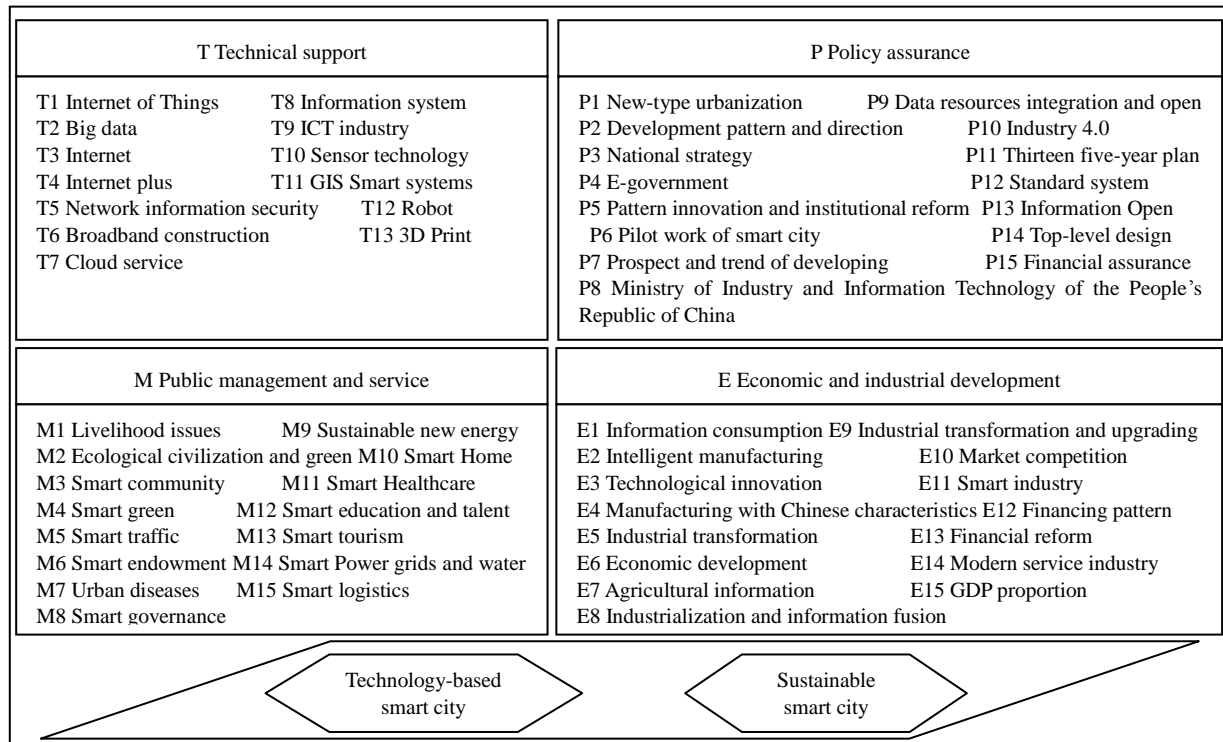
Economic and industrial development perspective: the public awareness of the concept of smart city focused on information consumption and intelligent manufacturing. The economy and industry of smart city combination of economic construction with the construction of smart city, plays the advantages of market competition, promotes economic development, in order to achieve the modernization reform of the financial system, build economic industrial competitive advantage. Smart city promotes the innovation and application of information technology in industry, strengthens cooperation among industries, shares Internet resources, improves the flexibility of intelligent factories, and realizes the integration of industrialization and information. An emphasis on business-led urban development and creative activities for the promotion of urban growth increase scientific and technological innovation and entrepreneurial capacity<sup>[15]</sup>. Many institutions build urban innovation environment together. Smart city improves service-oriented manufacturing, supports enterprises to shift from traditional manufacturing to service-oriented manufacturing, and gradually integrates products and services with product and service innovation, provides production services to meet customer demand, and promotes urban industrial transformation and upgrading.

Public management and service perspective: the public awareness of the concept of smart city focuses on livelihood issues, ecological civilization and green. Ecological civilization promotes green manufacturing, establishment of green products of industrial products, creates intelligent green supply chain. Smart city maintains the interests of enterprises and the interests of society to consistency, and strives to minimize the negative impact of the product on the environment with economic levers. Smart city promotes environmental protection, creates an ecological network to real-time collect environmental information, establishes a dynamic regulatory network, and a large environmental data center. Smart city applies big data to improve environmental management and intelligence.

## **6. ANALYSIS OF THE COGNITIVE MODEL OF THE CONCEPT OF SMART CITY**

### **6.1 Conceptual cognition of smart city**

We collect the key words of the China Smart City website by using the reptile technology. We put forward the cognition model of the concept of smart city which is in line with the public's cognition, as shown in figure 2.



**Figure 2. Conceptual cognition of smart city**

The first part is the technical support, which includes the traditional broadband network communication technology, also contains big data, Internet of Things and other new-generation information technology. Urban security, reliable operation cannot be or lack of the technical support. Technologies merge the real world and the Internet world together to achieve the perception, control and intelligent services for people and things. The second part is the policy assurance. From the mentioned quantity of the statistical data, we can see that the policy assurance is the largest mentioned quantity of smart city on the network. Policy assurance is conducive to achieving information open, resource sharing, and protecting financial fund, promoting the development of smart city. The third part is the development of economic and industrial, the consumption of information products and information services brings unprecedented changes to urban production, life, management, economic and social. Innovation, high-tech industries and modern service industry will become the most important pillar industries in smart city. The construction of smart city will lead to the industrial development with a large number of broad market prospects, low resource consumption, more employment opportunities and comprehensive benefits. The fourth part is the public management and services. Through a series of intelligent projects of the construction of smart community, smart medical, and smart green, smart city promote the healthy operation of the city, the harmonious development of society, ecological green living. Smart boost service and boost development.

In summary, we believe that the concept of smart city refers to the Internet of things, big data and other new generation of information technology, and the assurance of urban policy development strategy. By integrating all kinds of resources, information, services, system together, smart city optimizes urban planning and management, promotes the sharing of resources, complex and unique intelligence application service, and realizes the technology innovation, economic and industrial transformation and upgrading, information development, ecological efficiency and sustainable development.

In addition, there are two kinds of academic research on the cognitive pattern of the concept of smart city: the first researches on the cognition of the concept of technology-based smart city, and the second researches on the cognition of the concept of sustainable smart city. Technology-based smart city mainly research technical



support for the basic construction of smart city. Sustainable smart city focuses on the purpose with the information technology support, finally realizes the sustainable development of urban economy, industry, and management.

The European Parliament defines smart city as follows <sup>[10]</sup>: “A smart city is a city seeking to address public issues via information and communication technology (ICT)-based solutions on the basis of a multi-stakeholder, municipality based partnership.” This is quite broad, while the Japanese definition is more specific, focusing on energy, infrastructure, ICT, and lifestyle.

The basic concept of a smart city includes three components as follows <sup>[10]</sup>. Broadband infrastructure (T6) is pivotal, offering connectivity to citizens, institutions, and organizations. It includes both wired and wireless networks. E-governance (P4) focuses on a government’s performance through the electronic medium to facilitate an efficient, speedy, transparent process for disseminating information to the public and also for performing administration activities. An e-government system consists of three components: government-to-citizen, government-to-business, and government-to-government. E-government allows citizens to fulfill their civic and social responsibilities through a Web portal. The E-services involves applying ICT in the provision of services, including sales, customer service, and delivery.

Many countries have built a big picture of “Smart City” with their own characteristics. There are many typical practices in technology-based smart city. For example, America starts integrate all resources and data to serve the demands of the public by using the digital city from IBM proposed smart earth strategy in 2009; “i-Japan 2015” strategic focus on three public utilities about e-government, education and talent cultivation, medical and health information services. In addition, there are many countries that took practices for the construction of sustainable smart city. Finland is known for its clean natural environment, the development of “water smart” has become a unique landscape of urban environmental protection <sup>[16]</sup>; the construction of smart city in Sweden reduces the emissions of vehicle exhaust and greenhouse gas by improving the urban transport system.

## **6.2 Technology-based smart city**

Technology-based smart city is based on intensive data processing, intelligent perception, new generation communication network, virtual reality, space and geographic information processing (T11), and so on. It involves the core domains of urban planning and development, public safety, environment, traffic and energy, population and health and so on. It is the important carrier of information technology in the integrated application, geared to a series of key technologies and complicated application system in the modern urban operation service and management. It is the main direction of urban information (T8) construction in the future. The system of technology-based smart city generally includes the perceptual layer, data platform layer and application service layer.

The perception layer of the city relies on the sensing technology (T10) and the GIS intelligent system to recognize and gather each aspect data (T2) in the city with intelligent perception. The data platform layer uses the Internet of Things (T1) and the new generation of Internet (T3) to realize data transmission, storage and utilization. This layer includes the cloud platform (T7), visualization and simulation, urban multi-mode data integration analysis (P9), information opening (P13) and spatial decision simulation, and human-centered public service and platform of smart city. It provides reuse and flexible deployment capability for the development of smart city application. The layer of application service faces the upper level of industry applications to provide some common services and technical support, and achieve complex and unique intelligence application services.

## **6.3 Sustainable smart city**

Sustainable smart city improve urban innovation and development capacity and operational efficiency through the new type of technological innovation, and to achieve the ecological (M2), environmentally friendly (M4), green, coordinated and sustainable development (M9). The sustainable development of smart city

includes: (1) Smart city meet the sustainable development of technological innovation. Sustainable smart city build “triple play” and big data platform (T2) by integrating and applying a new generation of information technology, Internet of Things (T1), the Internet (T3), cloud computing (T7) and other technology, to establish an innovation technology support system of smart city. (2) Intelligent application and smart economic development (E6) improves the efficiency of the social service, promotes the development of ecological, low-carbon economic. Relying on the innovative technology support system, smart city improves the intelligence of urban infrastructure and social service, raise the management of urban infrastructure, reduce the consumption of energy resources, solve the consequences of urban disease (M7), and improves the overall quality efficiency of service in the society. Sustainable smart city guides the city more eco-low carbon development by upgrading efficiency to save energy. (3) Sustainable smart city improves urban intelligence management and services with technological innovation to promote the fairness of the allocation of resources, and achieve cost savings of social management and social operation, so as to enhance the sustainable development of society as a whole.

It can be seen that the conceptual model of the concept of smart city not only can explain the characteristics of technology-based smart city, but also explain the characteristics of sustainable smart city. The characteristics of technology-based smart city and sustainable smart city are illustrated in Table 2. Technology-based smart city focuses on technical support, which achieves the urban public management and services. Sustainable Smart City is concerned about the green ecology of urban public management and services, less the pursuit of economic and industrial development. It is only when the coordination of the two complements each other that the construction of the actual smart city can be come true with achieving the innovation and development of the city.

**Table 2. Summary of the cognitive pattern of the concept of smart city**

Types	T Technical support	P Policy assurance	E Economic and industrial development	M Public management and service
Technology-based smart city	T1,T2,T3,T7,T8,T10,T11	P4,P9,P13	E1,E3,E11	M3,M4,M5,M6,M8,M10,M11,M12,M13,M14,M15
Sustainable smart city	T1,T2,T3,T5,T7	P1	E6	M2,M4,M7,M9,

## 7. CONCLUSIONS

First, this article studies the public cognition about the concept of smart city from the perspective of network media and data, collects and analyzes the network data in China smart city website through social web crawler technology, classifies and summarizes the cognitive data of the related concept of smart city. Cognitive pattern of the concept of smart city has the labels of technology support, which mainly include Internet of Things, big data, Internet, Internet plus, the network information security; cognitive pattern of the concept of smart city has the labels of policy assurance, which mainly include new-type urbanization, urban development pattern and the direction, the national strategy, city mode innovation and system reform, and the pilot work of smart city; cognitive pattern of the concept of smart city the labels of economic and industrial development, which mainly include information consumption, intelligent manufacturing, manufacturing with Chinese characteristics, industrial transformation, scientific and technological innovation and entrepreneurship ability; cognitive pattern of the concept of smart city has the labels of public management and service, which mainly include ecological civilization and green, livelihood issues, smart community, smart green and smart traffic.

Second, there is no uniform definition of the concept of smart city. Different organizations and scholars have different views on smart city from different dimensions and perspectives. In our research, the e-commerce portrait technology builds the cognitive model of the concept of smart city. The concept of smart city refers to the Internet of Things, big data and other new generation of information technology, and the assurance of urban

policy development strategy. Smart city promotes the sharing of resources, provides complex and unique intelligence application service to realizes the technology innovation, economic and industrial transformation and upgrading, information development, ecological efficiency and sustainable development through integrating all kinds of resources, information, services, system together, smart city optimize urban planning and management.

In the end, according to the two kinds of smart cities, we analyze the characteristics and conceptual differences between the two, and suggest that when constructing the actual smart city, we should realize coordinated and complementary to achieve the innovation and development of the city. We consider that the cognitive pattern of the concept of smart city provides some insight to future research.

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