

The relationship between technology and urban development and the study of Smart City

Zhanning Wang*

School of Urban and Rural Planning, Zhengzhou University of Aeronautics, Zhengzhou 450046, China

*Corresponding author: wangzn@zua.edu.cn

Keywords: Smart cities, Intelligence cities, Urban resilience, Technological tools, big data.

Abstract: This paper explores the impact of smart technology on cities, briefly analyses the difference between smart cities and intelligence cities, and reflects on issues such as the crisis of trust and AI sensibility with the results of several surveys related to smart technology. Combined with the current pandemic, it explains the great significance of building and developing smart cities in the areas of transportation, housing, environmental protection, industry, healthcare, education. We analyse urban architectural design in the smart era.

1. Introduction

We are currently in an era of rapid technological development, and technology has had a profound impact on China, especially its cities. Today China's cities are taking on a whole new look, a process of continuous evolution and transformation, as China's population continues to grow and its economic structure continues to change in the future. In the midst of such historical trends, our surroundings will change dramatically [1].

But the sudden pandemic in 2020 brought shock to the city and people's lives were seriously affected, when the role of technology became more important. Relying on intelligent means, face-to-face contact or interaction between people can be avoided or reduced. For example, activities that originally required human and human voices to interact with each other now become human and equipment, human and machine interactions. Robot food delivery was used during the epidemic, and machinery is now beginning to replace manual work on a large scale in some factories, which is the basis for a pan-smart city [2].

If we compare with the SARS period, we can clearly feel that we have very obvious results in terms of efficiency, technological means, strength and speed in the process of fighting the new crown epidemic, which is supported by the pan-smart city technology means behind.

The inclusion of technological tools in cities can increase their resilience during a pandemic, which is reflected in all major areas of the city, such as the restaurant industry, the medical industry, residential areas, and office areas. The fact that almost all of the security of life during a pandemic relies on technological means makes it clearer that technology is an indispensable factor in urban development.

However, there are also different voices arising, such as those who are increasingly distrustful of technology, fearing that humans will be adversely affected by over-reliance on technology, or even fear colonization by robots. Some people prefer tradition and don't care about technology. This is a question worth exploring, while we ponder what smart cities actually bring us. And how can technological tools affect the development of cities?

2. Mechanism

2.1 Smart Cities and intelligence Cities

The exploration of smart cities started in 1999, and the related articles were included in New Zealand Geographer.

And for China, smart city is a very important concept in urban development in recent years [3]. Smart cities are mainly built on the basis of information systems, which include mobile Internet, Internet of Things, etc. A smart city is a concept similar to an urban life form, and the goal is to make the city as intelligent as a human being. There is another new concept called smart city, which is a more novel and action-oriented concept compared to smart city. The technical basis of smart city is artificial intelligence, which is more of an action system. The smart city is a deep integration of technological innovation and urban development, empowering cities through technology and forward-looking urban development concepts, promoting the process of urban intelligence in an ecologically integrated and upgraded way, realizing inclusive and convenient people's life, efficient and accurate urban governance, high-quality industrial economy, green and livable resources and environment, and intelligent and reliable infrastructure, and is a supply-side structural reform that supports urban services and It is a new concept, new mode and new form of urban development to meet the needs of good urban life [4].

Table 1. The difference between Smart Cities and intelligence Citie

	Past domestic smart city construction	Smart City
Targeting	Multiple industry IT applications	Increased urban intelligence and sustainable optimization
Development Focus	Building business systems across departments	Empowering the 5 major systems of industry, governance, services, environment and foundation
Focus	Meeting the needs of business units	Intelligent service centered on service users
Technical Support	GIS, mobile Internet and other digital network technology applications	Open and integrated, interconnected system ecology
System Features	Multiple system overlays and interconnections	Based on cloud computing and big data, with a focus on intelligent technology, the integrated use of blockchain, artificial intelligence, security, Internet of things, cloud computing and other technologies

Compared with smart cities, the concept of intelligence cities based on "artificial intelligence" will provide new ideas for urban governance. Intelligent government systems can provide powerful decision-making functions for complex problems and solve the problem of scarce government resources. The construction of intelligent transportation will also greatly relieve the traffic pressure in cities and reduce the safety risks in traffic. Intelligent healthcare will further improve the efficiency of public healthcare services and promote the equalization of medical resources to alleviate the conflict between doctors and patients. Smart security system based on big data can efficiently relieve the pressure faced by big cities in terms of comprehensive social management, crime and mobile population. Smart education will also reshape the traditional education system and change the education ecology, putting forward new requirements for lifelong education and innovative education. The smart city itself is a process of development and a future-oriented concept. The equalization of resources such as education and medical care achieved by smart cities reflects a human-oriented character. Moreover, the smart city system will significantly improve the efficiency of using social resources in order to achieve sustainable social development. At the same time, however, the concept of smart cities is still in its infancy and faces risks such as uncertainty of smart development, high costs, unemployment, and privacy protection. Whether and how these problems can be solved in the future will be a key factor in the realization and development of smart cities [5].

2.2 AI and Urban Life

The City AI Perception Index provides a quantitative reference for the role of AI in city construction. Typical city residents have a high degree of AI demand, and residents' happiness is positively correlated with AI perception. According to the research results, the current AI demand of city residents is higher than the AI usage index, indicating that AI technology still has development potential in the lives of city residents. The current development of AI technology in first-tier cities is relatively good, and the scores of AI demand index and AI use index of residents in first-tier cities are higher than those of residents in second-tier cities. According to the correlation analysis, the AI usage index of residents in each point-type city is positively correlated with citizens' happiness in life, indicating that the AI usage index can positively influence city residents' happiness in urban life to a certain extent: the more frequently citizens use scenarios at the AI level, the more happiness they will have in their lives [6]. Based on such results, it is clear that smart facilities have a positive effect on urban life.

Cities are required to pull together urban stakeholders to deploy smart solutions that address urban concerns and have long-term positive effects. The Quadruple Helix (QH) innovation approach can be utilized as the foundation for co-producing smart city projects in order to better capture their impacts, according to research demonstrate how incorporating QH stakeholders in impact assessment co-production increases a project's ability to deliver and analyze impacts that matter to cities and communities. This emphasizes the importance of quantitative research in resolving challenges. [7].

2.3 Researchers' investigation of data analysis in smart cities

The proliferation of artificial intelligence, sensor technologies, and wireless connectivity has enabled ubiquitous sensing via dispersed sensors. These sensors are network domains that lead to smart systems in healthcare, transportation, the environment, and other important branches and networks. End-user devices are connected to each other through collaborative interaction among smart systems, allowing for the creation of a new integrated entity known as Smart Cities.

There is a document that provides a thorough examination of data analytics in smart cities. The goal of this study is to focus on one of the most important branches of smart cities, namely Smart Mobility, and its favorable impact on the decision-making process in smart cities. Intelligent decision-making systems in smart mobility provide numerous benefits, including energy savings, city traffic relaying, and, most critically, air pollution reduction, by providing real-time valuable information and imperative knowledge. Due to the numerous and high-dimensional aspects and parameters that are not often collected, making a timely decision in smart cities is difficult. They address current challenges in smart cities and provide an overview of potential solutions, before proposing a framework for these solutions, dubbed universal smart cities decision making, that includes three main sections: data capturing, data analysis, and decision making, to optimize smart mobility within smart cities. With this framework, they elaborate on fundamental concepts of big data, machine learning, and deep learning algorithms that have been applied to smart cities and discuss the role of these algorithms in decision making for smart mobility in smart cities [8].

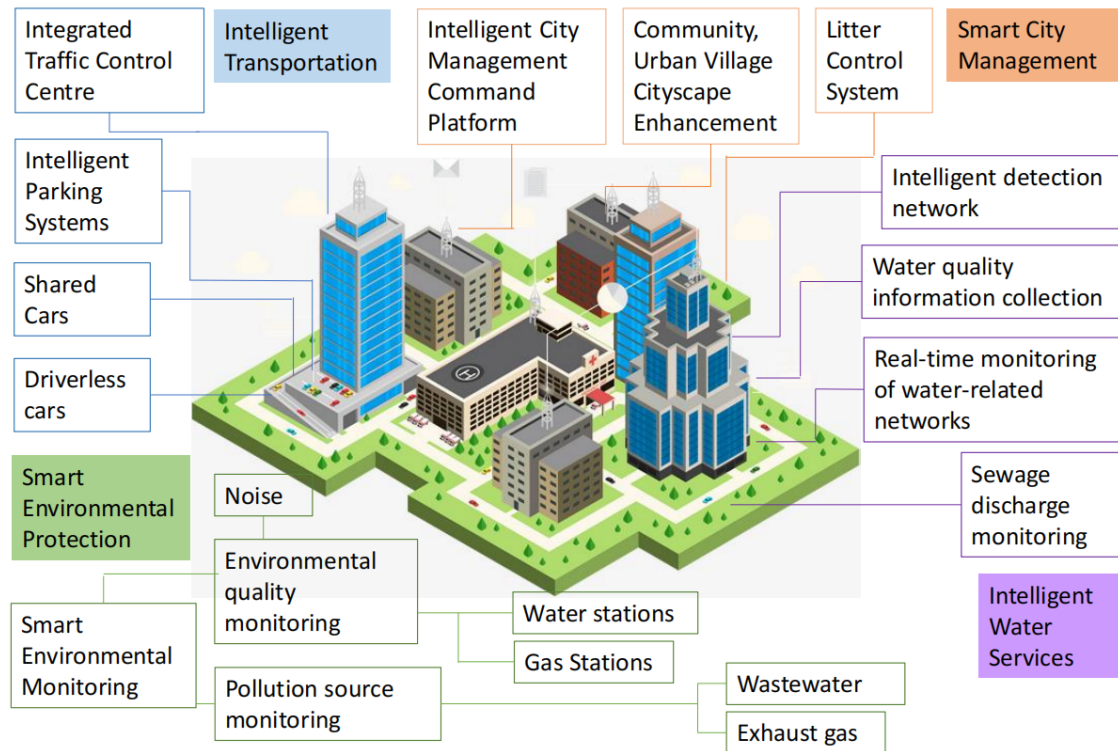


Figure 1. Framework of smart city

2.4 Survey analysis on the crisis of confidence

In the face of constant technological advances, which we generally believe will contribute to the continued improvement of smart cities, I noticed in the course of looking up information on the Internet that some people showed a degree of concern. In September 2021, my companion and I conducted a survey using robotic restaurants as an entry point.

We used a semi-structured survey, talking to ten people, getting permission and then recording and collating the results.

We also published a questionnaire, and finally collected 95 valid questionnaires. We integrated these data and used cross-tabulation analysis and other methods to compile correlations between the factors and analyze the resulting trust crisis.

2.5 Urban planning in the process of building a intelligence city

At present, in the construction process of smart city, it gradually starts to rely on powerful big data and artificial intelligence technology capability to provide intelligent planning solutions for city managers from point planning, line planning to surface planning by mining different sample features and fusing multi-source data.

(1) Point Planning

Provide public service point location (gas station, charging pile, billboard), IoT site location (air, water quality, soil), public resource location (ambulance, police station), commercial location (shopping mall, hotel, restaurant) services.

(2) Line Planning

Including public line site planning, unreasonable road detection, bicycle lane planning and driving track route planning (police car, cab, ambulance) services.

(3) Surface planning

Including area division, function identification, intelligent town and industry planning services [6].

TABLE 2. Smart City Planning

2.6 The idea of Artificial Intelligence Space City

The scope of research on smart cities has become increasingly broadened and has now produced research related to the construction of artificial intelligence in future space cities, arguing for the advantages of building artificially intelligent space cities and providing innovative design ideas for core systems of artificial intelligence and their specific applications in various areas of space cities. Specifically, future space cities can use AI technology to control intelligent monitoring systems and intelligent power distribution systems, and operate efficiently through the application of AI in areas such as urban transport, logistics, home, food, healthcare, security, education, mental health and legislation to achieve new innovations in human society. The research in this article is an innovative concept for future space city construction solutions, which can also provide a reference for the general construction of smart cities on Earth in the future [9].

3. Result

According to our survey, we can see that there is no serious crisis of trust in the post-epidemic era, and most people are still willing to trust technology. Of course, we are also willing to accept different views, because everyone thinks differently. Based on the methods and results of previous studies, plus our own research, I have come to the following conclusions.

(1) Smart technology has a vital role to play in contemporary cities, and the governance of cities has become inseparable from technology as they continue to develop to this day, and such a large and complex system needs the support of technology.

(2) In the face of the epidemic, the role played by technology cannot be ignored, and the pandemic has not hindered the progress of technology, but rather forced technology to develop rapidly. In the face of an uncertain future, we do not know whether the pandemic will coexist with humans in the long term, but only smart technology can enhance the comprehensive resilience of cities.

(3) In the short term, humans have not created a crisis of trust in technology. Although there are different viewpoints, most people are supportive of technological development and believe in technology, which will help smart cities to be built because people are more and more accepting of smart technologies, and the younger they are, the more likely they are to accept them.

(4) There is an important significance in the process of building only cities with big data. First of all, the smart city of the current process of modernization of the city inevitable road. In the background of information explosion, the analysis and use of data can effectively help managers to manage the city, the scientific nature and reliability of big data can help city managers to make more correct decisions, but also to provide a more comfortable living environment for city residents. In addition, the analysis and application of big data model is based on the initial real information, so the results obtained are more personalized and can meet the needs of different terminals. This feature is important for the development of smart cities, which can help urban residents of different age groups and genders to better adapt to the city, making it more livable and modern, and promoting the integration of the city and its inhabitants [10].

4. Conclusion

4.1 Smart technology and the development of cities

The value of smart city governance is reflected in the planning for the future, sustainable development and human-centeredness, while the benign development of technology will also facilitate the transformation of smart cities to intelligence cities. For some people's concern, this will not affect our value judgment on technology.

The scope of research into smart cities is becoming broader and more branching out as technology develops, which is a good trend because smart technology has many benefits for human life, and refined research is an important guarantee of technological progress. Smart technology has been integrated into the city and the two are inseparable, influencing each other. Smart technology provides

the city with a role in managing and keeping it running, and the city in turn influences the direction and progress of the technology.

4.2 Urban resilience in the post-epidemic era

In the post-epidemic era, the growing risk challenges have placed new and higher demands on urban governance. Building resilient cities and improving the effectiveness of urban governance is a necessary requirement to better cope with various risk challenges and uncertainties. A resilient city means a city that is able to withstand disasters on its own, mitigate damage, and deploy resources wisely to recover quickly from disasters. "Hardware" is the material security of a resilient city, including improving the security system for strategic and emergency materials such as residents' daily necessities and municipal energy, accelerating the transformation of old neighbourhoods, and improving the safety and quality of life of urban residents. "Software" is the soul of a resilient city, such as strengthening risk awareness, enhancing the ability to identify and anticipate risks, and achieving source management and precise control. A resilient city is also essentially a smart city. The use of new information technologies such as big data, artificial intelligence, mobile internet and cloud computing played a key role in the prevention and control of the epidemic, the resumption of work and the normal operation of the city in this new crown epidemic. On the other hand, attention should also be paid to the vulnerability of digital technologies themselves, retaining traditional technologies appropriately, making good backups of key information, important data and related platforms and facilities, avoiding over-reliance on technology, and at the same time promoting the integration of digital technologies with traditional infrastructure to realize the organic connection between smart and resilient cities [11].

4.3 Concerns in smart city design

Of all the areas of smart city design, technology has received the most attention, while spatial design has received the least. But from the perspective of city building, the reality may be the opposite. Successful smart cities need, first and foremost, to fundamentally maintain the essential qualities that have always characterised large cities - they must be vehicles that can repeatedly record the complexity and diversity of human life. The intelligent digital networks that currently exist in cities are essential and should be integrated, but we should focus more on the excellence of physical urban placemaking [12].

References

- [1] China High Level Forum on Development, Speech by Johnson Hua, Global Senior Director of McKinsey & Company and Director of McKinsey Global Institute. March 2021
- [2] Ying Long, At the crossroads of urbanization, Embracing the Fourth Industrial Revolution Technology. Urban and Rural Planning, Issue 3, 2020, P.13
- [3] As a new thinking and perspective of urban development, smart city started from the conversion of the concept of "smart earth" proposed by IBM in 2008. See Koo and min Wang, "Theoretical thinking and strategic choice of smart city construction," Journal of Shanghai Academy of Administration 2019, No. 5, 2012, p. 74
- [4] Software and Integrated Circuits, 《2019 China Smart City Development Strategy and Strategy Study》, Issue 11, 2019
- [5] Qiqi Gao and Yang Liu: Urban governance in the era of artificial intelligence*. The Journal of Shanghai Administration Institute, vol. 20, no. 2.
- [6] China Artificial Intelligence City Perceptiveness Index Report, Ariadne Consulting and Shang Tang Technology, 2018

- [7] Paskaleva Krassimira, Evans James, Watson Kelly, Co-producing smart cities: A Quadruple Helix approach to assessment, Journal of European Urban and Regional Studies Volume 28, Issue 4. 2021. PP 395-412
- [8] Farid Ghareh Mohammadi, Farzan Shenavarmasouleh, M. Hadi Amini, Hamid R. Arabnia, Data Analytics for Smart cities: Challenges and Promises, 12 Sep 2021
- [9] Songling Tong, Kairui Ding, Yu Mei, Xiangyu Lu: Application of artificial intelligence in the construction of future space cities
- [10] Lan Wu, The use of big data in the construction of smart cities
- [11] Zhao Liu, How Nantong can improve urban resilience in the post-epidemic era, Nantong Daily, 8 October 2021
- [12] Paul Schlapobeski, Dennis Pipes, Landscape Architecture, 10 May 2020, P110-116