# Research on Optimization Path of Smart City Management Mode Supported by Big Data

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## Abstract

**The level of science and technology in China is constantly improving with the development of economy. In the current era, science and technology have actually penetrated into all fields of society. With the proposal of smart city, how to efficiently realize smart city management and how to innovate the way of city management have become issues that people in related fields need to explore. In this context, the introduction and application of big data have effectively solved this problem. With the support of big data technology, we can realize the orderly and scientific management of smart cities. Big data can control the operation of the whole city, from small urban sections to the whole city, providing managers with accurate and comprehensive decision support, and bringing convenient life services to urban residents. Therefore, relevant personnel should pay attention to the application of big data, and use this technology to achieve efficient urban management and control.**

## Keywords

**Big Data; Smart City; Analysis.**

## 1. Introduction

In the process of building smart cities in China, many factors have interfered and restricted them, such as space, economy and so on. With the continuous innovation and optimization of science and information technology, big data technology came into being, and was immediately favored by urban managers. The introduction of big data technology into urban management can effectively improve the scientificity and intelligence of urban management, bring accurate and efficient auxiliary information to decision makers, and bring real-time scientific life help to urban people. Based on this, the author will analyze the concept of big data and the overview of smart cities, and put forward the role of big data in promoting smart cities. I hope that under the discussion of this article, I can make corresponding contributions to the field of smart cities in China.

## 2. Big Data and Smart City

### 2.1. Overview of Big Data Technology

The so-called big data, also known as huge amount of data, means that there are many kinds and huge scale of data resources. These data can't be collected and analyzed by manual mode in a short time, but they need to be processed by computer under the background of science and technology. Among them, having big data system and corresponding standard system is a new emerging technical way to help the development of the field and promote urban construction in the current social environment. Its functions are as follows: First, the rational introduction and application of big data technology can effectively speed up the construction rate of smart cities and promote the development level of smart cities. In 2012, China

established the incomparable position of big data technology in the management of smart cities, which provided a key guarantee for the sustainable and stable operation of cities and the promotion of the transformation and development rate of urban comprehensive structures. In the current era, advanced science and technology such as cloud computing and intelligent technology have been widely applied to every detail of smart city management, and they are integrated with big data technology, which greatly saves the time needed for smart city construction, reduces the construction budget and improves the efficiency of smart city management. In addition, the big data technology has also brought a lot of information resources for the creation of smart cities. By monitoring the design of every road section in the city, we can check the urban traffic situation in real time. Big data technology has also played an important role in the fields of ecological environment and people's livelihood [1].

## 2.2. Smart City

The so-called smart city, that is, the application of information and communication as a mode to explore and integrate the overall operation center system of the city, is related to the people's real life, ecological environment protection and so on. With the help of scientific information technology, it controls cities, promotes the quality of urban construction, and effectively optimizes people's actual living standards. At the same time, we will continue to innovate the urban construction and operation to achieve the sustainable development and progress of the city. With the help of scientific and technological means, the corresponding scholars are realizing better intelligent management of cities, creating a convenient and safe living environment for people, and realizing urban construction under the people-oriented ideology. The goal of smart city construction is to regard people as the core and foundation. By constructing an efficient and quick information consultation and processing system, data can be analyzed and summarized, so as to improve people's quality of life, reduce unnecessary consumption of urban resources and reduce the pressure of urban operation.

## 3. The Value of Big Data Technology in Urban Management

### 3.1. Point out the All-round Direction for the Smart City

Nowadays, scientific information technology, which is constantly updated, has penetrated into various fields in the social environment, and has accelerated the development rate of the information field, thus promoting the continuous progress of the information field. As far as hardware and integrated facilities are concerned, big data technology has played a very significant positive role in industries such as chips, which is conducive to the development of comprehensive information storage servers. In addition, the introduction and application of big data technology can solve and analyze data within the fastest speed, which brings considerable convenience to government affairs. Therefore, in the process of smart city management, rational and effective use of big data technology can provide effective decision support for smart city management and control, and realize the scientificity and modernity of China's government management.

### 3.2. Provide Technical Support for Smart City Management

As a new scientific and technological model, big data technology plays a very significant role in decision-making support for the management of smart cities in China. This is mainly because big data technology can not only effectively save and calculate related information resources, but also quickly check and search out the most effective data content in large-scale data environment. This realizes that the corresponding departments can get the most accurate and valuable information, thus achieving the effective management of smart cities. In addition, with the continuous improvement of big data technology, the introduction of big data technology in

urban management can also take comprehensive data information as a basic reference to provide technical support for smart city management [2].

### 3.3.   Bring New Opportunities for Urban Management

In the process of resource information collection, complete sensor technology is the guarantee of smooth transmission of information data. Through the application of Internet of Things technology, urban intelligent management resources can be continuously collected in the management process, such as the form and route of vehicles, urban building planning, etc. Through a unified interface, all the collected information will be transmitted to the database of smart city management, so as to comprehensively check, test and control the operation of the city. Secondly, in the process of data information processing, based on the characteristics of urban management and control information with various contents and huge amount of data, through the introduction and application of big data technology, the most useful information can be checked and searched out in a large amount of data information at the first time, and the information can be quickly researched and processed, and the final processing results can be displayed concisely, finally providing convenient and scientific analysis and decision-making for management staff. Therefore, although the management of smart cities is complicated, the rational use of big data technology can effectively alleviate this problem and ensure the orderly management of smart cities. Finally, in the work of processing information, big data technology can greatly promote the efficient use of corresponding information by management staff, promote the living results of people in cities, and ensure the smooth completion of urban management. Therefore, the use of big data has incomparable advantages for urban management.

## 4.   Urban Management Optimization Measures Supported by Big Data

Smart city management based on big data is not only an information overview of smart city management, but also a scientific goal of city management. Through cloud computing, big data and other technologies, it analyzes and explores all the contents of urban management through intelligent measures, and promotes urban management towards real-time and intelligent trend. Big data provides advantages in adjustment control, prediction and analysis for smart city management, and is an essential description of urban development trend. At the same time, urban big data is also a key asset of smart city management and control. Through a variety of resource libraries, such as grid library and vehicle library, it creates basic information support in the process of urban management to achieve more scientific and efficient management [3].

### 4.1.   Optimization of Big Data in the Field of Transportation

With the help of the resource data sorting function and information analysis function of big data technology, we can grasp the actual traffic conditions of each road in the city in an all-round and real-time way in the process of smart city management. Moreover, under the analysis ability of big data technology, we can also grasp the reasons that affect the speed of vehicles in cities, so that it is convenient for smart city managers to scientifically optimize and rectify the signals and warning signs at traffic intersections, and effectively reduce the traffic pressure in cities. Under the background of such a big data support, the urban traffic congestion is optimized efficiently. With the ability of big data analysis, it also creates a reasonable and scientific basis for the design of emergency plans for urban road traffic accidents, which is conducive to reducing the probability of traffic accidents in cities and building a safe travel environment for the broad masses of people. Of course, from people's point of view, according to big data science and technology, people can know the traffic conditions in cities in real time, avoid going out when the traffic flow and people flow the most, avoid traffic accidents at congested intersections, and ensure the safety of people's lives and property. Going out is more

convenient and efficient. For example, software widely implemented at this stage, such as Tencent Maps, can provide people with real-time query and understanding of traffic routes. As long as you open the positioning, you can get information such as the distance between your destination and your location, and the road conditions.

## 4.2. Optimization of Big Data in the Field of Smart Sanitation

In the field of smart sanitation in cities, with the help of advanced technologies such as the Internet of Things and cloud computing, we plan the levels of roads and sanitation grids in cities, and conduct comprehensive real-time control of sanitation vehicles and sanitation personnel involved in the process of sanitation management, so as to effectively promote the effectiveness of sanitation work, reduce unnecessary resource costs, and provide practical and effective help for urban sanitation planning and sanitation management.

### 4.2.1. Sanitation Equipment Coverage

According to the real-time information of vehicle Beidou positioning needed for sanitation work, the running track, cleaning route and cleaning frequency of each sanitation vehicle in the working process are studied. On this basis, we can obtain the cleaning rate of sanitation equipment and the information of the road sections that are not covered, scientifically rectify the working lines of sanitation vehicles, practically promote the cleaning area and walking distance of sanitation vehicles, and effectively deal with the defects in the process of social service, such as high cost, low effectiveness and lack of experience [4].

### 4.2.2. Manual Cleaning Coverage Analysis

According to the GPS positioning equipment installed by the sanitation workers, the road cleaning in the actual work of sanitation work is checked and tested, and the number of on-the-job sanitation workers in each sanitation grid is analyzed. So as to make standard staff division arrangement, find out the regional scope where no sanitation workers work, and provide a scientific and comprehensive information basis for the scheduling of sanitation workers.

### 4.2.3. Garbage Truck Cover

Same as the labor and equipment coverage mode mentioned above, with the help of big data technology in cities, the information data of garbage transfer station, garbage pickup truck and transportation carrying capacity of pickup truck in cities are analyzed. Then, according to the urban geographic information system, reasonably divide the number of pickup trucks in each grid, ensure that pickup trucks can achieve the shortest distance and the fastest time in the transportation process, improve the quality of garbage pickup, and optimize the management mode of urban sanitation.

## 4.3. Optimization of Big Data in the Field of Environmental Protection

With the support of big data technology, the field of environmental protection in smart city management has also been effectively optimized and innovated. The role of big data in this respect is mainly reflected in the inspection and testing of ecological environmental pollution sources and pollution early warning. These two aspects of work can effectively help the staff to fully understand the pollution situation of the city, and at the same time, according to the pollution situation of the city, carry out the design of environmental management measures. In detail, monitoring stations are set up in each pollution source of the environment, and the relevant information of each environmental monitoring station is checked in real time with the support of big data technology. If the pollution to the environment is very serious, the corresponding information will be automatically transmitted to the monitoring station. After the analysis and integration of big data, the environmental pollution situation can be summarized, and the exact type of pollution can be obtained. Then, the corresponding information analysis results will be transmitted to the staff of the environmental supervision and inspection station, providing convenience for the staff to design environmental protection

measures. Of course, with the support of big data technology, the environmental management of smart cities has been highly efficient and scientific. This has greatly improved the intensity of comprehensive urban management, promoted the progress of environmental protection benefits, and brought new ideas and new measures for environmental management, which is conducive to ensuring the proper living environment of the people in the city and bringing people Jinshan Yinshan and green mountains [5].

## 4.4. Optimization of Big Data in the Field of Smart Public Toilets

Public toilets are also a key component of the smart city system. With the support of big data technology, smart public toilets have also been effectively optimized and innovated. With the help of big data technology, we can collect and integrate urban grid information in all directions, such as commercial areas, residential areas, urban roads, etc. in the city, so as to achieve a comprehensive grasp of the coverage of public toilets and the surrounding conditions of public toilets, and effectively realize the extraction of areas not covered by public toilets, thus providing accurate conclusion support for design layout, phased task management and control, and optimization and improvement. In the actual work process, the introduction and application of the Internet of Things technology mode can make a comprehensive research and analysis on the flow of people around the public toilets, the direction of the odor emitted by the public toilets, the application of public toilet facilities, and the damage of the internal equipment of the public toilets with the help of its hardware data and business information analysis. Thus, it provides the actual results basis for the scientific design and planning of urban managers, hardware transformation, etc., effectively achieves the long-distance supervision and control of the overall environmental sanitation of public toilets and the on-the-job status of public toilet staff, promotes the effectiveness of public toilet management and control, and achieves that public toilet management problems can be found out at the first time and responded in time.

## 4.5. Optimization of Big Data in the Field of Urban Planning

**Table 1.** Urban Planning Incident Management Reverse Lookup Table

| Event type | Responsible community | Belonging community | Structure | Address |
|---|---|---|---|---|
| Unauthorized construction | 320508001021 | Xincang Garden | Sun room | Top floor of West Unit, Building 32, Xincang Garden |
| Unauthorized construction | 320508001021 | Xincang Garden | Broken wall | Xincang Garden Middle of Building 18-19 |
| Unauthorized construction | 320508001021 | Jinxiu Xinyuan | Canopy | Tongnan Road Jinxiu Xinyuan Building 7 |
| Unauthorized construction | 320508001021 | Yin Qiao Xin Cun | Broken wall | Room 104, Building 3, Laodong Yinqiao New Village |
| Unauthorized construction | 320508001021 | Sanxiang new village | Canopy | South yard, Room 101, Building 62, Sanxiang New Village |
| Unauthorized construction | 320508001021 | Sanxiang new village | Sun room | Sanxiang New Village 17-10 |
| Unauthorized construction | 320508001021 | Sanxiang new village | Sun room | Room 303, East Building 15, Xiangxin Village, Sun Room, Sanxin Village |

In the process of intelligent urban design and planning, through the introduction of big data technology, it is possible to regularly analyze the relevant information and materials in urban development, and to create efficient and reasonable measures for the overall prevention of

natural disasters in cities based on man-made loss prevention. This can reduce unnecessary losses caused by disasters to a certain extent, and ensure the safety of people's lives and property to the greatest extent, thus ensuring the safe and stable operation of the city. In detail, when big data technology provides support for the development and progress of smart cities, it mainly explores and studies the construction land, the overall urban construction space, the number of people in the city, the traffic environment, public services and green space, etc., so as to carry out effective urban design control and promote the rationality and completeness management of smart cities on the premise of these information materials. When exploring and studying the urban construction land plate, the staff mainly use big data to grasp the expansion of urban construction land. The number and distribution of urban residents are comprehensively studied in the degree of urban economic development and urban space. The spatial pattern is explored in the areas covered by public service centers in cities. It can be seen from this that the rational application of big data technology can bring great convenience to the management and design of smart cities, so that managers can clearly get the traffic, population, resources and other aspects of the city, and lay the foundation for high-quality urban planning.

## 4.6.  Optimization of Big Data in the Field of Smart Garden

Through the introduction and application of big data technology, the scientific integration and exploration of all aspects of information resources in the city will be carried out, and the green parks in the city will be made scientific and technological. According to the revised establishment criteria, the platform display will be carried out, so that one garden, one criterion and one place, one standard can be achieved in the process of garden ecological maintenance. At the same time, through the rational use of science and technology such as the Internet of Things, the maintenance staff will be positioned in real time, so as to record the number of times of vegetation maintenance, realize the knowledge of the maintenance work, and provide evidence for vegetation protection. Thereby effectively and efficiently reducing the communication cost between managers and staff, improving the quality of work and promoting the effectiveness of work.

## 4.7.  Optimization of Big Data in the Field of Public Life

People who live in cities are also the key components in the process of urban intelligent management. With the support of big data technology, they also play a positive role in the real life of people in cities. It mainly summarizes and analyzes the actual living needs of urban people and people's lifestyle. For example, people can create accurate and complete information retrieval functions for people living in cities and provide convenience for people's lives by applying big data technology in daily travel, travel, driving, payment of living expenses and lost and found [6].

## 4.8.  Optimization of Big Data in the Field of Digital Urban Management

The application of big data technology in smart city management can achieve scientific and effective system processes of digital city management and control information resources collection, task dispatch, event handling, achievement inspection and final evaluation, and effectively realize problem prevention and scientific management and control. Big data analysis and early warning is to explore and analyze the time and space characteristics of people and things with the help of big data technology and knowledge of sociology and other subjects, and to integrate the time and space characteristics of people and events with the characteristics of grid cities. At the same time, according to the uploaded space-time hotspot research of different event categories, we can predict the possible event categories in different time periods and different areas in the intelligent grid, to conduct scientific and rigorous prevention and judgment on the upcoming events, achieve the initiative of urban intelligent management, and improve the quality of management and control.

# 5. Conclusion

To sum up, this article focuses on the central content of big data, analyzes its concept and the concept of smart city, and discusses the positive significance of big data for smart city management. Introducing big data technology into smart city management can effectively optimize the traffic environment, innovate urban planning, protect the ecological environment, and bring convenience to people's real life. Big data, an emerging technology, plays an important role in the management of smart cities. Workers in the corresponding fields should recognize the advantages of big data and tap its value, to make urban management more scientific and effective, and benefit the people.

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