Research on the Path of Sustainable Development of Mega-cities based on the Background of Big Data: Taking Wuhan City as an Example

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Abstract: The application of big data technology in the process of urban sustainable development is already an irreversible trend. China's 14th Five-Year Plan clearly points out that it is necessary to accelerate digital development, promote the construction of new cities, and promote the level of sustainable urban development. As one of the megacities in China, Wuhan is taking the path of urban construction, urban governance, urban planning, independent innovation, and rational allocation of resources based on benefiting from policy dividends and in-depth big data, it will help promote the sustainable development of Wuhan to a higher level.

1 INTRODUCTION

As the scale of cities continues to expand and the number of cities continues to increase, more and more cities have joined the ranks of megacities. The sustainable development and social governance of such cities is inevitable problems. In the impact of data technology on the sustainable development of cities, there are still problems such as the lack of overall planning in the use of data, the imperfect data sharing mechanism, and the emphasis on infrastructure rather than operation and management.

Therefore, it is necessary to seek new solutions and countermeasures for the many problems that affect the sustainable development of the city caused by the continuous expansion of Wuhan. With the attention of the state, Wuhan's goal of using big data technology for sustainable development has risen to a strategic level and has become its future development direction.

Actively follow the path of independent innovation in the planning, construction, layout and application of big data technology, firmly grasp the initiative in their own hands, and strive to make greater contributions to the sustainable development of Wuhan.

2 ANALYSIS OF THE STATUS QUO OF SUSTAINABLE DEVELOPMENT IN WUHAN UNDER THE BACKGROUND OF BIG DATA

As a sub-provincial city, a national central city, and a provincial capital, Wuhan has taken the lead in benefiting from the policy dividends of national development, and vigorously carried out urban construction based on data integration, laying a solid foundation for Wuhan's sustainable development strategy.

2.1 The Wuhan Municipal Government Attaches Great Importance

In the "Wuhan City Big Data Industry Development Action Plan", it is clearly pointed out that it is necessary to take advantage of the big data industry development opportunities to accelerate the scale upgrade and informatization construction of Wuhan's information industry, improve independent innovation capabilities, and combine the big data industry with application characteristics to form unique development advantage (Huang and Wang,

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2021). At the same time, it will strengthen the construction of big data industry bases and communication infrastructure and create big data centers (mainly including municipal cloud data centers, geospatial information cloud data centers, etc.). In addition, the Wuhan Municipal Government has used the huge scale of higher education in Wuhan to continuously build a big data theory and application center to give it the greatest degree of support.

2.2 Introduce Foreign Investment to Help the Development of Wuhan's Big Data Industry

Wuhan actively responds to the country's deployment of the big data industry in megacities, and actively introduces the world's top 500 IT central enterprises-China Electronics Corporation and Kaijin Holdings Group. At the same time, it vigorously supports the Yangtze River Yuntong Group to promote the development of the enterprise in terms of resources, capital and technology. As a digital city construction platform, Changjiang Yuntong Group will build a data industry analysis group with data interconnection in order to better assist the development of Wuhan's urban big data industry.

2.3 Wuhan City's Achievements in Sustainable Urban Development under the Background of Big Data

Relying on the big data platform, Wuhan is actively building a smart city in all aspects, including smart government affairs, smart transportation, smart medical and other smart facilities. The Wuhan Internet Information Office, under the guidance of the Municipal Party Committee and the Municipal Government, formulated big data industry policies and created a "Cloud Wuhan" government affairs platform, which greatly improved the efficiency of government departments in terms of information sharing, the "information island" that has long hindered Wuhan's economic development has been broken, and the interconnection of data has been truly realized (Zhou and Wang, 2021).

In terms of medical care, Wuhan has formed a complete medical and health emergency response, management and command system by building a regional medical information platform for residents' health files and using technologies such as big data and the Internet of Things to highly integrate health resources. At the same time, the big data platform has also made remarkable achievements in assisting medical, health, and epidemic prevention, especially during the epidemic in Wuhan, it learned the population flow through big data, judged the spread of the epidemic in advance and combining the diagnosis results to find the trajectory of close contacts, etc., have greatly promoted the sustainable development of urban medical care (Wu, 2021).

In terms of urban transportation, through the establishment of a big data smart platform, the effect of data fusion and channel linkage is achieved, and construct a comprehensive network system that combines people, vehicles, and roads to provide real-time warning of abnormal traffic conditions, accurately monitor congested road sections, established a traffic police service linkage system. Secondly, through the Internet intelligent transportation system, citizens can use mobile APP and other Internet means to check and implement updated road condition information through multiple channels. Finally, in terms of data sharing, it can provide protection for the public security organs to detect cases, daily public security management, and public transportation.

3 SHORTCOMINGS IN THE SUSTAINABLE DEVELOPMENT OF WUHAN IN THE CONTEXT OF BIG DATA

3.1 Lack of Overall Planning for Data Use

As early as Wuhan City's opinions on accelerating the promotion and application of big data to promote the development of the big data industry were issued and implemented, various data platforms in Wuhan have been established one after another, but there is still a lack of planning in terms of data management and public participation. The evaluation and monitoring capabilities in the process of urban sustainable development need to be improved. The use of big data for data analysis and subsequent implementation effects have not yet completed, scientific, and reasonable institutional arrangements, it is difficult to meet the needs of enterprises and society.

The overall design is rigid. In the process of urban sustainable development under big data monitoring, there is a lack of perfect design of the big data platform, and it often shows weaknesses such as poor self-adjustment ability when faced with special

circumstances. For example, in the face of heavy rain disasters, we will use big data to prepare in advance, but after the heavy rain disasters, public health, urban traffic and other issues will inevitably arise. This kind of cross-platform data information and data operation team may lack cooperation due to the inconsistency of goals, and finally appear chaotic and inefficient problems.

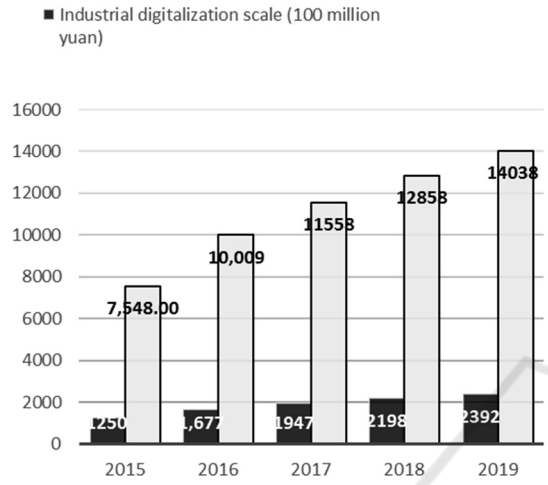

Figure 1: Hubei Province's Digital Economy Structure.

3.2 Data Sharing Mechanism Needs to Be Improved

Information is the source of result analysis, and government departments also highly rely on the integrated analysis of multiple information to achieve scientific decision-making when making management decisions for the city.

However, for multi-departmental information collection, due to imperfect mechanisms, data sharing cannot be carried out in a timely manner, and departmental linkage is slow, which has a greater impact on the efficiency of urban management and decision-making efficiency of government departments (Wang, Wang 2021). At the same time, due to the large number of data platforms, official and unofficial platform data will be different, which brings a certain degree of difficulty to the integration of government-enterprise data.

3.3 Focus on Infrastructure and Light on Operation Management

Since the implementation of the "Wuhan City Big Data Industry Development Action Plan", Wuhan has introduced many technology companies, which has greatly improved the hardware system, and data centers, servers, and corresponding cloud computing capabilities are already available. Great investment in urban development relying on big data, which greatly reflects the emphasis on infrastructure.

Secondly, in terms of operations, it takes a lot of effort to maintain the operation of the hardware system on the infrastructure, it is very easy to contradictions in the use of data and operation management in the early stage, resulting in imbalanced performance and output. Eventually, due to low efficiency, it will have an impact on government decision-making.

4 THE PATH OF SUSTAINABLE DEVELOPMENT IN WUHAN UNDER THE BACKGROUND OF BIG DATA

The Wuhan Bureau of Natural Resources and Planning began to formulate the "Wuhan City Epidemic Rehabilitation Plan" at the early stage of epidemic control, clearly pointing out that many problems have been exposed in public service facilities, urban operation and management, and the construction of smart cities (Hao, Ma 2021).

During this period, the role of big data is of extraordinary significance. It is a new engine for the sustainable development of Wuhan and brings new opportunities for the economic development of Wuhan. The combination of a good overall plan and the use of existing advantages is conducive to becoming a huge driving force for Wuhan's economic growth. Big data provides new ideas for the sustainable development of cities. How to combine data and information technology with sustainable development has tried to explore the following path.

4.1 Explore the Establishment of New Models and Optimize the Allocation of Data Resources

The configuration of data resources is not a single configuration, but a combination of "data + enterprise", "data + government affairs", "data + technology" and other environments to promote the joint development of data and industry. Thereby enhancing the intelligence level of data serving enterprises and society and improving the quality of data in practice.

Data resources are the central system of urban operations. In Wuhan, according to the development status of different regions and industries, the

correlation of data resource allocation is analyzed, and finally, obvious targeted measures are formed on this basis. Whether the data and industry are properly allocated is the key to measuring the effectiveness of the new model, in order to achieve a reasonable allocation of data and industry, innovations should be made in investment and operation (Li 2019).

The most important measure is that the government authorizes its official data and establishes a data platform with industries or companies. For example, Medea's Wuhan factory actively connects with the Wuhan Big Data Administration to jointly build a super-big data platform in related fields to realize unimpeded data flow, and while creating high-quality and efficient products, it can accurately grasp market trends and market demand, thereby leading the industry consumption upgrade.

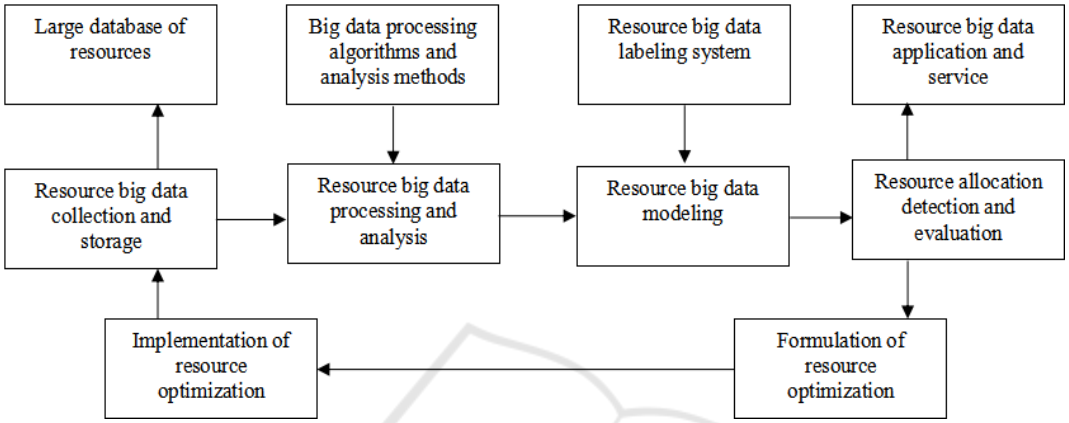

Figure 2: Block diagram of the optimal allocation model of big data resources.

4.2 Grasp the New Development Pattern and Firm the Path of Independent Innovation

The most essential feature of building a new development pattern is to achieve a high level of self-reliance. Technological self-reliance and are the strategic support for the development of a country and a city.

Continuously achieve breakthroughs in the field of science and technology through independent innovation, and promptly convert scientific and technological theories into scientific and technological achievements, forming a connection between the innovation chain and the industrial chain, forming a strong competitiveness in the market, and forming a strong productivity in the society. Break through key technical bottlenecks with high quality and high level and promote a new development pattern.

As a city of higher education and technology, Wuhan has profound educational resources and basic conditions. At present, Wuhan has research centers for IGS (International GNSS Service Organization) data, data governance and global data, spatio-temporal big data, and other research centers in universities, national laboratories for big data and health protection, big data application technology in the government and society. Relying on this innovative condition, it can inject strong impetus into the high-level development of science and technology in Wuhan, break the "data barrier", and realize the transformation of scientific and technological innovation results in an orderly manner.

4.3 Deepen Big Data Technology and Improve the Level of Urban Governance

"Data openness" is a typical sign of big data technology in the process of urban governance. In the new era, data resources are also one of the public infrastructures. The use of massive data to develop various applications and maximize the value of data is one of the effective means of urban governance (Deng, Yang, Wu, Chen 2019).

During the epidemic, in order to solve the problem of finding close contacts, the national government affairs platform united multiple departments and multiple Internet platforms to form a close contact inquiry system, laying the foundation for Internet companies to develop health codes.

The application of this in Wuhan has also received significant results and has made a great contribution to the effective control of the epidemic. Secondly, big data technology has also played a key role in urban

environmental governance. In the detection of urban environmental pollution, big data can detect changes in environmental quality indicators in real time, and analyze the massive data collected to form a complete set of environmental governance plans.

The analysis results can be used as an important basis for environmental governance departments to make decisions and improve the scientific nature of their decisions (Fang, Hu 2020). In terms of urban social governance, in the past, due to the limitations of the times, the government used coercive methods to govern the society, and the rights of most people were not fully realized.

In modern society, big data technology can help the government better fulfill this requirement, better realize the dialogue between the government and the residents, help build a more open, inclusive, high-quality city with a modern level of urban governance. Specially, urban residents have a strong sense of rights and have higher quality requirements for living standards.

4.4 Strengthen the Linkage between Data and Improve the Overall Urban Planning

The overall planning of the city is increasingly affected by big data, traditional urban planning mainly relies on manual surveying and mapping and the support of census data.

There are obvious information distortions and shortcomings in data, which have great limitations on the long-term planning of the entire city. With the support of big data today, the big data technology is fully integrated into the overall situation of urban planning, and the combination of traditional government data and new social network data can be more conducive to the rational planning of the city.

Secondly, in terms of urban functional zoning, the overall analysis of urban population size, land use level, and architectural planning layout is carried out through big data, and a reasonable urban functional zoning is planned, through the integration of mobile communication equipment, positioning systems and other data platforms, it provides a new channel for the analysis and understanding of urban spatial structure. Finally, in urban planning, make good use of big data technology to improve the overall planning of the city, so that it is not limited to one street and one district in the city, but to form a more complete urban structure.

As far as Wuhan City is concerned, its long-term urban planning should be consistent with the overall planning of Hubei Province, which is more conducive to driving regional economic development. At present, big data cloud computing analysis technology has made great progress, and its application can make urban planning more scientific.

5 CONCLUSION

With the support of big data technology, Wuhan can establish a more complete urban order, a higher level of urban governance, and a more sustainable urban development.

Based on optimizing the allocation of data resources, taking the road of technological independent innovation, and accelerating the construction of "digital cities" and "smart cities", promote the long-term sustainable development of Wuhan City under the support of big data technology, and strive to become a model of sustainable urban development in the central region.

On this basis, it will greatly enhance its outward attraction, radiation and agglomeration power as a central city.

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