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Research on the Informatization Construction of Territorial Space

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Abstract

The construction of territorial and spatial informatization is an important task for the application of big data technology to further deepen and improve the construction of a system under the current background of the extensive construction of smart cities across the country. This paper analyzes the development status of land and space information at home and abroad, and discusses the problems that arise in the process of spatial big data fusion and intelligent transformation, and organically integrates information optimization with service research, comprehensive evaluation, etc., and proposes targeted suggestions for the supporting role of the industry. The suggestion is to provide some valuable theoretical references for the follow-up research direction.

Keywords

Land and space; informatization; big data; service application

1. The purpose and significance of the research

Territorial space is the place and environment for human existence, including living space, production space and ecological space, collectively referred to as "Sansheng Space". In order to ensure the improvement of the quality of human life and the harmonious development of society, the coordinated development of Sansheng Space must be fully guaranteed And high-quality construction [1-2]. After the 19th National Congress of the National Development and Reform Commission and the Ministry of Housing and Urban-Rural Development, two major ministries and commissions, the National Development and Reform Commission and the Ministry of Housing and Urban-Rural Development, approved the first national-level urban agglomeration plan of the "Guanzhong Plain Urban Agglomeration Development Plan" for the national strategy of ecological civilization construction and the concept of building a community of landscapes, forests, fields and lakes. Under the current background of the extensive construction of smart cities across the country, the new business management of land and resources needs to innovate informatization management mode, improve the service mode and standardization of land and resources informatization management, and promote the coordination of the whole process of land and space planning and use control. Taking land and space resource information as the center, extensively using informatization big data technology, integrating basic statistical data such as population, economy, natural resources, and real-time dynamic data such as the Internet of Things and the Internet, mining and analyzing the relationship between data, and tracking the land in real time The dynamic changes and development trends of space, the thematic maps, statistical charts, three-dimensional real scenes and other visual forms to display the results of decision-making analysis, comprehensively improve the application and service capabilities of territorial space big data [3-4].

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2. Current status of development in this field at home and abroad

The optimization of the territorial spatial pattern is an important means to improve national competitiveness and promote regional coordination and sustainable development. Internationally, developed countries such as Japan, Germany, and the Netherlands have made great progress in territorial and spatial planning and optimization, especially in territorial and spatial planning systems, planning laws, planning agencies, use control, etc., and provide for the optimization of territorial space. Guaranteed. Among them, Germany has formed a complete territorial space planning system composed of three levels of federal, federal state, and local spatial master planning and professional departmental planning. The division of labor from top to bottom is clear, and the hierarchical relationship is closely connected, which provides control over the use of territorial space. Strong guidance; Japan has formed a territorial and spatial planning system with eight types at three levels, consisting of regions, subdivisions, and neighborhoods. The territorial space mainly focuses on restricting land development permits and development rights; the Dutch territorial and spatial planning system is presented It is a structural system of three levels (regional planning, overall planning, and regulatory planning) and nine types (land consolidation planning, land use planning, regional structure planning, city structure planning, etc.).

The related theoretical research and practical exploration of domestic land space optimization originated in the field of geography. In the 1980s, the nationwide comprehensive agricultural zoning was compiled into "China's 1:1 Million Land Use Map", which provided a scientific basis for land resource management and land space optimization. The "T"-shaped strategy of China's land development and economic layout based on the theory of "point-axis system" provides an operable theoretical structure for land development, productivity distribution and regional economic development, and forms a framework for China's land development and layout optimization. Basic layout plan. After 2000, with the development of China's rapid urbanization and the increasingly prominent contradiction between resources and the environment, the main functional zoning based on the theory of territorial function has become the main content of optimizing the spatial pattern of the country. The "Several Opinions of the Central Committee of the Communist Party of China and the State Council on Establishing a Territorial and Spatial Planning System and Supervising Its Implementation" issued on May 9, 2019 further clarified the basic role of territorial and spatial planning, the main content and related requirements of the territorial and spatial planning system. Land and space planning has become an important support for optimizing the land and space pattern.

At present, a large number of theoretical researches have been carried out on land and space planning. Among them, the carrying capacity of resources and the environment and the evaluation of the suitability of land and space development (double evaluation) are an important prerequisite for the preparation of land and space planning and an important starting point for the implementation of monitoring, evaluation and early warning of land and space planning. (Ecological space, agricultural space and urban space), delineating the three lines (ecological protection red line, permanent basic farmland control line and urban development boundary) and other aspects play an important role. As the land and space planning and "dual evaluation" work has just started, the relevant theoretical foundation, implementation plan, technical regulations, method system, etc. are not yet complete, and relevant scholars have successively carried out a lot of research work. With the further development of research on “information society”, “smart society”, and “smart city”, cities and social spaces with deep integration of digitization, networking and intelligence have gradually been built, and more attention has been paid to the application of new technologies to economic and social development, The impact of residents’ lives and work, as well as social and space management. For example, through the mining and processing of various spatiotemporal big

data, analyze the challenges faced by the development of cities and territorial space, monitor the flow and connection of elements between different functional spaces; use WebGIS, three-dimensional reality and visualization technology to achieve the integration of urban elements, Analysis and management to enhance the participation of decision makers, planners, citizens, and experts in the planning process, as well as collaborative planning between different subjects. Domestic scholars have also conducted a lot of research and exploration on how to apply big data and other technical means to urban and territorial spatial planning, involving new technologies such as big data and artificial intelligence in urban and regional spatial simulation analysis, planning methods, and spatial dynamics. Application exploration in different fields such as monitoring and evaluation, space planning and management. The continuous innovation and development of smart technology is also playing an increasing role in smart city information and planning management services. From early computer-aided design technology to GIS-based spatial analysis, to the universal application of Internet big data, mobile terminal big data, urban operation and monitoring big data, etc., to optimize the spatial structure of the urban system, urban functional zoning, and public service facilities The layout and the fine management of the city provide strong support. The city simulation technology based on machine learning and artificial intelligence provides technical support for the simulation and prediction of city growth and the preparation of more forward-looking urban planning. In addition, the development of various urban smart information platforms led by the City Information Model (CIM) is also supporting the application of smart cities. For example, the CityIF cloud platform launched by Beijing Institute of Urban Planning and Design that can explore and process multi-source data and provide multiple service efficiencies for different groups in the city. Generally speaking, traditional computer-aided technology and GIS spatial analysis methods are still widely used in urban spatial planning and management. New technologies and new methods such as Internet big data, artificial intelligence, and machine learning are involved in smart cities. However, the practice and application of spatial information management and services in smart cities still need to be further improved and deepened.

3. Supporting role for the industry

3.1. Provide technical support for the land and space planning of the natural resources industry

Through the integration and value-added of multi-source data of territorial spatial information, construct spatial mathematical models, study complex urban systems, and build urban governance decision-making platforms, which can perceive urban physical signs, dynamically monitor urban activities, evaluate and early-warning urban construction, preview the future of the city, and innovate the land The working methods and technical means of spatial planning provide technical support for the natural resources industry's territorial and spatial planning.

3.2. Promote research and innovation in the natural resources industry

Make full use of the advantages of the three parties in their respective fields, build an industry-university-research alliance, establish a comprehensive research platform, conduct joint research, achieve complementary advantages, promote integrated innovation, and form leading academic and research results in the field of land and space planning research and practice. Promote the improvement of research and innovation capabilities in the field of land and space planning and big data, and play an active role in improving the ability to respond to future urban planning and construction issues.

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3.3. Contribute to the smart and refined management of the city

The Internet of Things, cloud computing, artificial intelligence, mobile Internet, data mining, etc. are used as means to manage and serve all the elements of the city through sensing, so as to intelligently respond to various needs in the city, and improve the wisdom of city management. And refinement makes the planning of land and space more scientific, precise and efficient.

3.4. Leading the development of big data analysis industry

Based on the needs of urban big data analysis technology, establish a research and development and test platform to carry out research on big data preprocessing and quality control, heterogeneous multi-source big data mining and analysis, big data intelligent computing and visual analysis, etc. . Based on the support platform, strengthen collaborative research with member units or other advantageous units and regions, lead the development of the big data analysis industry, and provide basic support for government decision-making and enterprise innovation based on big data.

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