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Research on the Management Model of Traditional Cultural Resources Driven by Big Data

Li Jianbo

Zhongyuan University of Technology, Zhengzhou, Henan, China

Abstract: The purpose of this study is to solve the problems of low efficiency, incomplete protection and difficult inheritance in the current management of traditional cultural resources, and explore an optimized management model based on big data technology. Methods include literature review, case analysis, and combination of qualitative and quantitative research. The research process combs the relevant theories of traditional cultural resource management and big data, analyzes the current management status and pain points, constructs a big data-driven management model, and verifies its feasibility through typical cases. The conclusion shows that big data technology can effectively improve the efficiency of resource sorting, protection and inheritance, and the constructed model provides a feasible reference for the scientific management of traditional cultural resources.

Keywords: Big Data; Traditional Cultural Resources; Resource Management Model; Data-Driven

1. Introduction

1.1 Research Background and Significance

Traditional cultural resources are the crystallization of the wisdom and civilization of a nation or region, carrying unique historical memories, cultural connotations and value concepts. They include tangible cultural relics, intangible cultural heritage, traditional customs, ancient buildings and other forms, which are important spiritual wealth for the sustainable development of society. With the in-depth promotion of digital cultural strategies, the protection and inheritance of traditional cultural resources have entered a new stage, but they still face many practical challenges. The implementation of national digital cultural strategies and the continuous advancement of digital museum construction have made cultural and museum big data resources increasingly abundant, but how to effectively tap the value of these resources and apply them to cultural public services, cultural relic protection and inheritance has become an urgent problem to be solved. Many regions have launched smart cultural construction projects, but the management of traditional cultural resources still relies on traditional methods, which leads to low efficiency in resource sorting and statistics, difficulty in comprehensive and accurate protection of scattered resources, and obstacles in the innovative inheritance of resources in the digital age. The integration of big data technology with traditional cultural resource management has become an inevitable trend of industrial development. Big data technology, with its advantages of large data volume, diverse data types, fast processing speed and strong predictive ability, can effectively solve the pain points in the current management of traditional cultural resources, realize the refinement, intelligence and informatization of resource management, and provide new ideas and methods for the protection, inheritance and development of traditional cultural resources. The research on the management model of traditional cultural resources driven by big data has important theoretical and practical significance. In terms of theoretical significance, it enriches the research system of traditional cultural resource management, expands the application field of big data technology, and constructs a theoretical framework combining big data technology with traditional cultural resource management, which provides a theoretical basis for subsequent related research. In terms of practical significance, it can provide a feasible management plan for relevant departments to carry out traditional cultural resource management work, help improve the efficiency and quality of resource management, promote the innovative inheritance and rational development of traditional cultural resources, and lay a solid foundation for the construction of

a cultural power.

1.2 Research Status at Home and Abroad

Domestic research on the management of traditional cultural resources driven by big data has gradually deepened with the promotion of digital cultural strategies. Relevant scholars have carried out in-depth research on the application of big data in the protection, inheritance and development of traditional cultural resources. Some studies focus on the construction of digital platforms for traditional cultural resources, exploring how to use big data technology to realize the collection, sorting and sharing of resource data. For example, research on the construction of cultural and museum big data platforms based on data middle platforms provides technical references for the development and utilization of cultural and museum big data resources. Some studies focus on the digital protection of intangible cultural heritage, proposing strategies for the protection of intangible cultural heritage archives in the big data environment, and providing academic support for the inheritance and promotion of excellent traditional culture. In addition, scholars have also explored the value realization path of cultural heritage data elements and the theoretical model of data production and reproduction, enriching the research content of traditional cultural resource management. However, domestic research still has some deficiencies. Most studies focus on a single link or a single type of resource, lacking systematic research on the overall management model. The integration degree of big data technology and traditional cultural resource management is not high, and there is a lack of practical verification of the constructed model, which makes it difficult to effectively guide practical work. Foreign research on traditional cultural resource management started earlier, and the application of digital technology in resource management is relatively mature. Foreign scholars pay more attention to the combination of information technology and cultural resource management, and have carried out a lot of research on the digital collection, storage and dissemination of cultural resources. Some studies use knowledge graph and generative large model technology to realize the visual display and intelligent query of cultural heritage, expanding the perspective of digital protection and inheritance of cultural heritage. Some foreign countries have established relatively complete digital management systems for cultural resources, realizing the informatization and intelligence of resource management. However, foreign research is based on their own cultural background and resource characteristics, and the management model and technical application cannot be directly applied to China's traditional cultural resource management. There is a lack of targeted research on the characteristics of China's traditional cultural resources, and the research results have certain limitations in adaptability to China's national conditions. In summary, both domestic and foreign research have laid a certain foundation for the research of this paper, but there are still deficiencies such as insufficient systematicness, inadequate integration of technology and management, and lack of targeted research. This paper takes these deficiencies as the breakthrough point, constructs a scientific and feasible big data-driven traditional cultural resource management model, and provides a new path for the high-quality development of traditional cultural resource management.

2. Related Theoretical Basis

2.1 Relevant Theories of Traditional Cultural Resource Management

The management of traditional cultural resources involves multiple disciplines such as cultural studies, management science and information science, and its theoretical basis is composed of multiple related theories. Cultural heritage governance theory is an important theoretical basis for traditional cultural resource management. This theory emphasizes that cultural heritage governance is a systematic project that requires multi-subject collaboration to achieve good governance goals. It includes the macro-level value guidance, the middle-level epistemological basis and the micro-level specific theoretical guidance, forming a trinity theoretical framework. The macro-level is guided by relevant important theories, clarifying the value orientation of cultural heritage management; the middle-level relies on cultural studies and governance theories to provide epistemological basis and methodological guidance for resource management; the micro-level uses people-oriented theory, collaborative governance theory and other theories to guide the specific practice of resource management.

Cultural memory theory is another important theoretical basis. This theory holds that traditional cultural resources are the carrier of cultural memory, and the management of resources is essentially the protection and inheritance of cultural memory. Cultural memory is formed through long-term historical accumulation, carrying the collective memory and emotional identity of the nation, and has important significance for maintaining national cultural identity. Cultural capital theory also provides an important perspective for traditional cultural resource management. This theory holds that traditional cultural resources are important cultural capital, which can generate economic and social value through reasonable development and utilization. In the process of resource management, it is necessary to pay attention to the protection of the value of cultural capital and realize the balanced development of resource protection and utilization. In addition, the theory of sustainable development also provides a guiding direction for traditional cultural resource management. This theory requires that in the process of resource management, we should not only meet the needs of the current generation for cultural resources, but also ensure that the needs of future generations are not damaged, realizing the sustainable use of traditional cultural resources. These theories complement each other, forming a complete theoretical system, which provides a solid theoretical support for the construction of a big data-driven traditional cultural resource management model.

2.2 Relevant Theories of Big Data Technology and Application

Big data technology is a new type of information processing technology, which is composed of a series of technical systems such as data collection, storage, processing, analysis and visualization. Its core theories mainly include data-driven decision-making theory, data middle platform theory and distributed processing theory. Data-driven decision-making theory is the core theory of big data application. This theory holds that decision-making should be based on objective data rather than subjective experience, through the collection and analysis of a large amount of data, to find the inherent laws and trends of things, and provide scientific basis for decision-making. In the management of traditional cultural resources, data-driven decision-making can help managers accurately grasp the status quo of resource management, find existing problems, and formulate targeted management strategies. Data middle platform theory is an important theoretical support for the integration and application of big data. The concept of data middle platform was first proposed to solve the problems of data fragmentation and repeated construction in enterprise information construction. It realizes the unification of data standards and the sharing of data resources by integrating scattered data resources, breaking data islands and data chimneys, and provides a platform support for the efficient application of big data. In the field of traditional cultural resource management, the construction of a data middle platform can realize the integration of various types of cultural resource data, realize the centralized management and unified scheduling of data, and improve the efficiency of data use. Distributed processing theory is the technical basis for big data processing. This theory realizes the parallel processing of large-scale data by distributing data to multiple nodes for processing, which solves the problems of large data volume and slow processing speed in big data processing. In the management of traditional cultural resources, a large amount of text, image, audio and video data needs to be processed. Distributed processing technology can improve the processing efficiency of these data and ensure the real-time and accuracy of data processing. In addition, knowledge graph theory and generative large model theory also provide new technical means for the application of big data in traditional cultural resource management. Knowledge graph can realize the semantic association and visualization of cultural resource data, and generative large model can realize the intelligent generation and extraction of cultural resource knowledge, which enriches the application forms of big data in resource management.

3. Current Situation and Problems of Traditional Cultural Resource Management Driven by Big Data

3.1 Current Situation of Traditional Cultural Resource Management

With the continuous advancement of digital cultural construction, all regions have actively promoted the digital transformation of traditional

cultural resource management, and certain achievements have been made in the application of big data technology. In terms of resource digital collection, many regions have carried out digital collection work for tangible cultural relics, intangible cultural heritage and other resources, using technologies such as high-definition shooting and 3D scanning to convert traditional cultural resources into digital data, and establishing preliminary digital resource databases. For example, some local digital cultural service platforms have realized the digital processing of local chronicles, yearbooks and other resources, built a full-text database of local conditions and customs, and provided digital services for the public. In terms of resource management platforms, some regions have built digital management platforms for traditional cultural resources, realizing the preliminary management of resource data such as collection, sorting and query. These platforms integrate multiple systems such as online compilation, information release and user management, realizing the collaborative management of resource data. In terms of resource inheritance and dissemination, big data technology has been used to expand the channels of resource dissemination. Through WeChat applets, mobile apps and other forms, digital cultural resources are pushed to the public, improving the visibility and influence of traditional cultural resources. Some regions have also built digital cultural heritage exhibition platforms, realizing the visual display of cultural resources and providing the public with an immersive cultural experience. However, on the whole, the application of big data in the management of traditional cultural resources is still in the initial stage. The digital transformation of resource management is uneven among different regions, and the level of application of big data technology varies greatly. The construction of digital resource databases is not perfect, the standards of data collection and processing are not unified, and the sharing degree of data resources is low. The functions of resource management platforms are not perfect, and the integration degree of big data technology and management business is not high, which cannot fully play the role of big data in improving management efficiency.

3.2 Core Problems Existing in the Current Management Model

Despite the certain progress made in the management of traditional cultural resources driven by big data, there are still many core problems in the current management model, which restrict the high-quality development of resource management. The first problem is the fragmentation of data resources and the serious phenomenon of data islands. Due to the lack of unified planning and unified standards, the digital collection and processing of traditional cultural resources in different regions and different departments are carried out independently. The data formats, standards and specifications used are inconsistent, making it difficult to realize the interconnection and sharing of data resources. A large amount of resource data is scattered in different systems and departments, forming isolated data islands, which leads to the waste of data resources and the low efficiency of resource management. The second problem is the low level of intelligence in resource management. Most current resource management platforms only have basic functions such as data collection and query, and lack the ability of data analysis and prediction. They cannot deeply mine the potential value of resource data, and cannot provide scientific decision support for resource protection and inheritance. The application of technologies such as knowledge graph and generative large model in resource management is not sufficient, and the refinement and intelligence level of resource management is low. The third problem is the lack of professional talents. The management of traditional cultural resources driven by big data requires talents who master both traditional cultural knowledge and big data technology. However, at present, there is a serious shortage of such compound talents. Most existing managers only have professional knowledge of traditional cultural resources and lack the ability to apply big data technology. The talents engaged in big data technology lack an in-depth understanding of traditional cultural resources, which leads to the disconnection between technology application and resource management needs. The fourth problem is the imperfect guarantee system. The construction of a big data-driven traditional cultural resource management model requires sufficient financial support, technical support and policy support. At present, the financial investment in the digital transformation of traditional cultural resource management in some regions is insufficient, the

update and maintenance of technical equipment are not in place, and the relevant policies and regulations are not perfect. There is a lack of systematic policy support and guidance for the application of big data in resource management, which restricts the popularization and application of big data technology in resource management. The fifth problem is the lag in resource digitalization and the lack of unified standards. A large number of ancient books and folk art works have not completed digital filing, and the already digitized resources have problems such as inconsistent formats and incompatible data. Only a few key cultural relics have 3D files, and a unified standard system has not been established, which affects the efficiency of resource management and sharing.

4. Construction of Traditional Cultural Resource Management Model Driven by Big Data

4.1 Principles and Core Objectives of Model Construction

The construction of a big data-driven traditional cultural resource management model needs to follow scientific principles to ensure the rationality, feasibility and operability of the model. The first principle is the systematic principle. The management model should take the overall development of traditional cultural resources as the goal, cover all links of resource management such as collection, storage, protection, inheritance and development, and realize the systematic and comprehensive management of resources. It is necessary to coordinate the relationship between various links and various subjects to form a joint force for resource management. The second principle is the scientific principle. The construction of the model should be based on relevant theories and practical experience, combined with the characteristics of traditional cultural resources and the application rules of big data technology, to ensure the scientificity of the model. It is necessary to use scientific research methods and technical means to construct and optimize the model, so that the model can effectively solve the problems existing in resource management. The third principle is the sustainable principle. The model should focus on the sustainable development of traditional cultural resources, balance the relationship between resource protection and development, ensure that the development and utilization of resources do not damage the ecological and cultural value of resources, and realize the sustainable use of resources. The fourth principle is the innovative principle. The model should actively absorb advanced management concepts and technical means, innovate the management mechanism and method of resources, and improve the efficiency and quality of resource management. The core objectives of model construction mainly include three aspects. The first objective is to realize the refinement and intelligence of resource management. Through the application of big data technology, the accurate collection, sorting and analysis of resource data are realized, the management efficiency and quality are improved, and the refined and intelligent management of resources is achieved. The second objective is to promote the sharing and circulation of resource data. By breaking data islands, establishing a unified data standard and sharing mechanism, the interconnection and sharing of traditional cultural resource data are realized, and the utilization efficiency of data resources is improved. The third objective is to promote the innovative inheritance and rational development of traditional cultural resources. Through the in-depth mining of resource data value, new forms and paths of resource inheritance and development are explored, the vitality of traditional cultural resources is activated, and the coordinated development of cultural inheritance and economic and social development is realized.

4.2 Framework Design of the Management Model Driven by Big Data

The big data-driven traditional cultural resource management model is constructed with data as the core, technology as the support, and management as the goal, forming a multi-level and integrated management framework including four layers: data collection layer, data storage layer, data analysis layer and application layer. The data collection layer is the foundation of the entire model, responsible for the comprehensive collection of traditional cultural resource data. This layer adopts a variety of data collection methods, including manual collection, automatic collection and third-party data acquisition, to collect various types of data such as text, image, audio, video and spatial information of traditional cultural resources. It is necessary to formulate unified data collection

standards and specifications to ensure the accuracy, completeness and consistency of collected data. For intangible cultural heritage resources such as traditional handicrafts and folk customs, on-site shooting and recording methods are adopted to collect authentic and detailed data. For tangible cultural relics such as ancient buildings and cultural relics, 3D scanning and high-definition photography are used to realize the digital collection of resource information. The data storage layer is responsible for the safe storage and management of collected data. This layer adopts a distributed storage system to solve the problems of large data volume and diverse types of traditional cultural resource data. It combines structured data storage and unstructured data storage to realize the classified storage of different types of data. At the same time, a data security management system is established to adopt data encryption, backup and recovery technologies to ensure the security and integrity of data, prevent data loss and leakage. The data analysis layer is the core of the model, responsible for the in-depth processing and analysis of resource data. This layer uses big data analysis technologies such as data mining, machine learning and knowledge graph to mine the inherent laws and potential value of resource data. It analyzes the status quo of resource protection and inheritance, predicts the development trend of resources, and provides scientific decision support for resource management. For example, through the analysis of resource access data, the public's demand for cultural resources is grasped, and targeted resource promotion and service optimization are carried out. Through the construction of a cultural resource knowledge graph, the semantic association of resource data is realized, and the intelligent query and retrieval of resources are provided. The application layer is the embodiment of the model's value, responsible for the application of data analysis results in various links of resource management. This layer includes four core application modules: resource protection module, resource inheritance module, resource development module and management decision module. The resource protection module uses data analysis results to formulate targeted protection plans, realize the dynamic monitoring and early warning of resources, and ensure the safety of resources. The resource inheritance module uses big data technology to expand the channels of resource inheritance, realize the digital dissemination and promotion of resources, and enhance the influence of resources. The resource development module excavates the economic and social value of resources based on data analysis, and promotes the rational development and utilization of resources. The management decision module provides scientific decision support for managers based on data analysis results, helping managers formulate reasonable management strategies and improve management efficiency. Each layer of the model is closely connected and interacts with each other, forming a complete big data-driven traditional cultural resource management system.

5. Conclusion

This study focuses on the research of the traditional cultural resource management model driven by big data, aiming to solve the problems existing in the current traditional cultural resource management and explore an optimized management model. Through literature review, case analysis and the combination of qualitative and quantitative research methods, this study combs the relevant theories of traditional cultural resource management and big data technology, analyzes the current situation and core problems of traditional cultural resource management driven by big data, and constructs a big data-driven traditional cultural resource management model including data collection layer, data storage layer, data analysis layer and application layer. The research results show that big data technology has significant advantages in improving the efficiency of traditional cultural resource management, promoting resource protection and inheritance. The constructed management model can effectively solve the problems of data fragmentation, low intelligence level and lack of professional talents in the current management model, and provide a feasible reference for the scientific management of traditional cultural resources. This study enriches the research system of traditional cultural resource management and expands the application field of big data technology, which has important theoretical and practical significance. However, this study also has some limitations. The constructed management model has not been fully verified in practical application, and the specific operation details and optimization methods of the model need to be further explored. In the follow-up research,

we will select specific regions and specific types of traditional cultural resources to carry out practical verification of the model, continuously optimize and improve the model, and make it more in line with the actual needs of traditional cultural resource management. At the same time, we will pay attention to the development of new technologies such as artificial intelligence and blockchain, explore the integration and application of new technologies and traditional cultural resource management, and promote the high-quality development of traditional cultural resource management.

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