

Research on Digital Archives Construction of Jingdezhen Ceramic Material Cultural Heritage Based on Blockchain Technology

Yang Lisha

Abstract—With the rapid development of modern technology and information means, the society has entered a new stage of development. Under the background of the rapid development of digital technology, the ceramic material culture in Jingdezhen has also been seriously affected. In order to better realize the protection of Jingdezhen ceramic material culture, various modern means should be used to comprehensively protect the ceramic material and cultural heritage. Through the application of blockchain technology, more perfect digital archives can be constructed, which can be used as a basis to promote the smooth development of the protection of ceramic material cultural heritage. Therefore, the article first defines the basic overview of blockchain technology; Secondly, it makes an in-depth analysis of the current situation of the protection of Jingdezhen ceramic material culture; On this basis, the construction measures of Jingdezhen Ceramic Cultural Heritage Digital Archives Based on blockchain technology are put forward.

Index Terms—Blockchain technology, Jingdezhen ceramics, material cultural heritage, digital archives construction.

I. INTRODUCTION

In the process of China's historical development, porcelain is not only an artistic treasure of the Chinese nation, but also a symbol of Chinese civilization. As a world-famous porcelain capital, China produces countless kinds of high-quality pottery, especially the ancient colored porcelain and blue and white porcelain produced in Jingdezhen, which are widely welcomed all over the world. At the same time, Jingdezhen is a famous cultural city with a history of porcelain making for thousands of years. In this city, there is a very rich cultural heritage both on the ground and underground. Therefore, in order to better promote the smooth protection of Jingdezhen ceramic material cultural heritage, we should deeply explore the feasibility and innovation of the application of blockchain technology in ceramic cultural heritage. In order to ensure that the digital construction of ceramic heritage specimens can be carried out more smoothly, which has a vital practical significance for the protection and inheritance of historical and cultural heritage.

II. BASIC OVERVIEW OF BLOCKCHAIN TECHNOLOGY

Blockchain technology was originally a basic bitcoin technology. With the rapid development of society, it has

been updated to the 3.0 era. In essence, blockchain technology is a new application mode integrating a variety of high and new technologies, including encryption algorithm, distributed data information storage and consensus mechanism. Through the distributed data information database, it can effectively prolong the data information record list. In each block in the blockchain, the information contained is mainly data information and time. Each block can be associated with the information of the previous block. At the same time, blockchain technology also has many characteristics, such as openness, transparency and difficult to tamper. From the perspective of domestic and foreign research, the research and application of blockchain technology has been applied in various fields, and different scholars can understand and analyze this technology from different angles and fully explore the combined application of blockchain technology. Due to its encryption, openness, autonomy and other characteristics, blockchain technology has significant advantages in the process of digital copyright protection. Taking blockchain technology as an art work to carry out copyright registration, registered copyright transaction and authorization transaction can carry out time marking for intellectual property, And establish a sustainable ownership structure for works of art and other types of digital media. As early as 2010, China's copyright protection center has provided a public service mode of digital copyright, that is, DCI system. In this system, blockchain technology is mainly used as the basic content to realize the online registration of digital copyright. It can also provide a variety of service contents such as copyright transaction and copyright protection, And transfer each blockchain copyright registration information to the corresponding judicial verification center [1].

III. PROTECTION STATUS OF JINGDEZHEN CERAMIC CULTURE

A. Basic Characteristics of Jingdezhen Porcelain Making Skills

The manual porcelain making skills in Jingdezhen mainly include four aspects: raw material mining, ceramic decoration, ceramic firing and ceramic forming, including common process technologies such as printing blank, full kiln and making blank, as well as rare processes such as kaolin mining and glaze ash preparation. It has the characteristics of meticulous division of labor and high professional level. There are significant differences with traditional handicraft technology. Jingdezhen's traditional porcelain making

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The author is with Jingdezhen Ceramic University, Jingdezhen City, Jiangxi Province, 333403, China (e-mail: 315337663@qq.com).

process has a very significant feature of complexity. All work links are closely linked, and the division of labor is very fine. It is difficult to complete the production of ceramics by one person. It is precisely because the process is too complex, only those professionals with exquisite skills can better master the porcelain making technology, and the employees should not only maintain the craftsman spirit of excellence, The degree of specialization is also quite high. After thousands of years of historical development, the people of Jingdezhen have always relied on manual porcelain making skills to settle down and establish their homes, which has also played a good role in promoting the inheritance and development of ceramic culture. The manual porcelain making skills in Jingdezhen not only belong to a traditional skill, but also become the city card of Jingdezhen, which condenses the long-standing porcelain culture of Jingdezhen [2].

B. Current Situation of Jingdezhen Ceramic Culture Protection

Under the background of the continuous deepening of the current urbanization development process, with the continuous improvement of the construction of the new city, most folk workshops and famous kiln sites have been damaged to varying degrees. Although targeted remedial and protective measures have been adopted in the follow-up development process, the original ceramic cultural environment has gradually disappeared. At the same time, it is difficult for Jingdezhen's own economic strength to play an integral role in protection. From the perspective of actual situation, the main protection mode of Jingdezhen ceramic culture lies in productive protection. Through the construction of ancient kiln folk custom Expo area, it has become the inheritance place of Jingdezhen porcelain making skills, and the famous square parks established in major ceramic industrial parks, It also condenses all kinds of high-quality ceramic industrial workshops in Jingdezhen, which can effectively realize the intensive and large-scale transformation of manual porcelain making. With the rapid development of the current era, the protection and inheritance of Jingdezhen ceramic culture has also exposed a series of problems. Although the way of industrialized manufacturing can effectively improve the production efficiency, it will lead to the direct elimination of some manual porcelain making links. Although the way displayed through the traditional museum can meet the people's basic needs for traditional ceramic culture, it only stays at the static level, It is difficult to meet the basic needs of the living inheritance of ceramic culture. Although productive protection is a more appropriate way of protection at present, it still has significant limitations. In the traditional porcelain production, only the raw material mining needs to go through a variety of processes such as mountain exploration, ore burning, stone transportation and mud extraction. At present, the existing production modes of various folk ceramics have basically skipped this more complex link, and the porcelain mud that has been made is also used to start the molding and creation of ceramics, However, there is a missing link in the process display of traditional manual porcelain making technology. Although the manual production of ancient kilns can spread ceramic culture, the overall performance is strong and there is an

extremely serious commercial atmosphere, which is difficult to meet the basic needs of traditional ceramic technology in activity protection [3].

IV. CONSTRUCTION MEASURES OF JINGDEZHEN CERAMIC MATERIAL CULTURAL HERITAGE DIGITAL ARCHIVES BASED ON BLOCKCHAIN TECHNOLOGY

A. Research on the Application of Science and Technology in Cultural Heritage Protection

In terms of Archaeology and cultural heritage protection, the application of VR technology and GIS technology in the field of archaeology can carry out a variety of work such as data information collection, modeling and restoration for the corresponding archaeological objects, and play a good role in promoting the research service of archaeological work. At the same time, it can also expand the basic forms of cultural heritage protection, cultural research and cultural display, enrich the connotation of cultural heritage and promote the continuous improvement of cultural heritage research. The application of related data technology in the field of digital protection of cultural heritage can not only use unified standards and structured data information to describe the digital resources of all kinds of material and intangible cultural heritage, In order to effectively realize the main purpose of digital protection, so as to fully reveal the relationship between digital resources and entities in the basic unit of data information, and ensure that the digital resources of cultural heritage can be better inherited and transmitted while promoting the digital research of cultural heritage. From the above points, it can be seen that blockchain technology is mainly used in digital work management and work copyright in the field of work protection, while most of the research in the field of science, technology and cultural heritage focuses on the restoration of historical heritage and digital storage by using various scientific and technological means. Compared with these fields, There is little research on the application of blockchain technology in ceramic cultural heritage management. Blockchain technology is essentially a new Internet encryption technology, which can play a basic role in maintaining data and information security. It is significantly different from the traditional information security protection methods. Jingdezhen Ceramic historical and cultural heritage is a resource with richer historical value and records the history and culture of the Chinese nation, This also makes the research on the application of blockchain technology in the protection of ceramic historical heritage have extremely significant application value.

B. Construction of Digital Archives of Ceramic Material Cultural Heritage

First Application measures of blockchain technology in simulation splicing. Through the application of blockchain technology, the basic features of ceramic material cultural heritage can be comprehensively analyzed. Through WebGL, canvas and other technologies, it can realize better online simulation and online splicing between those image formats with blockchain features and 3D model files, and comprehensively extract the basic features of ceramic material cultural heritage after successful splicing, Further written into the blockchain alliance chain of Jingdezhen

cultural relics protection, which can also lay a solid foundation for the follow-up restoration of ceramic cultural heritage and daily management.

Second Application measures of blockchain technology in heritage restoration. In the process of the restoration of Jingdezhen ceramic material cultural heritage, the right to use can be granted to the relevant restoration team through the local cultural relics protection alliance. At the same time, the restoration team should also make detailed records of the restoration process of ceramic material cultural heritage in the actual process of work, and store the records in the blockchain private chain of the museum, It can preserve the corresponding data for the smooth development of the subsequent repair of ceramic material Cultural Heritage [4].

Third Application measures of blockchain technology in derivatives development. In the current process of ceramic material and cultural protection in Jingdezhen, ceramic material and cultural heritage can be made into corresponding derivatives, which can not only effectively meet the people's basic wishes for viewing and collecting ceramic material and cultural heritage, but also better promote China's ceramic culture. However, the key content is how to ensure the comprehensive quality of the imitations, which is also the key issue that restricts the commercial application of ceramic material and cultural heritage. Through the application of blockchain technology, we can fully combine the basic characteristics of ceramic material and cultural heritage and further provide consumers with corresponding authenticity services, so as to comprehensively improve consumers' enthusiasm for derivatives.

Fourth Application measures of blockchain technology in heritage mining. In the practical process of applying blockchain technology, we can further analyze the shape structure, decorative features, glaze color and other contents of ceramics in different ages according to the relevant ceramic cultural knowledge, so as to build a ceramic feature database in different ages, and then carry out dating and feature extraction of various ceramic material and cultural Heritage excavated in the archaeological process, Integrate the extracted basic features into the blockchain public chain of national cultural relics protection, so as to provide a comprehensive guarantee for the uniqueness and effectiveness of ceramic material cultural heritage.

V. EFFECTIVELY SOLVE THE PROBLEMS EXISTING IN THE CONSTRUCTION OF DIGITAL ARCHIVES OF CERAMIC MATERIAL CULTURAL HERITAGE

In the current social environment, various research results have verified the technical advantages of blockchain technology in digital archives management. However, because Jingdezhen ceramic material cultural heritage is vulnerable to human factors and various environmental factors, it will often be damaged to a certain extent. If we only rely on the existing functions of blockchain technology, It is difficult to fundamentally solve the problem of Digital Archives Construction of ceramic material cultural heritage. Therefore, targeted measures need to be taken to effectively solve various internal problems. Firstly, the extraction method and speed of the basic features of ceramic material cultural heritage. In the actual process of applying blockchain

technology, the data model of feature extraction should be continuously optimized according to the number of samples to ensure the balance between the efficiency and accuracy of feature matching. In the preliminary work stage, KD tree training mode should be adopted for less than 100 samples. If the number of samples is less than 10000, Cascade model should be adopted, and keras deep learning mode should be adopted when large-scale sample data is involved; The second is the protection and application of ceramic material cultural heritage. Due to the significant characteristics of ceramic material cultural heritage in the public chain and alliance chain of blockchain, we should sample and compare the restoration and derivatives of ceramic material cultural heritage, and further provide two completely different comparison portals of high precision and coarse granularity, through the monitoring camera of the restoration, And the photos of derivatives from different angles to compare the coarse granularity. After setting the threshold of the results, decide whether to carry out high-precision detection, so as to realize the verification of derivatives and restoration products; Finally, in the research methods used, the literature method, model method and case analysis method can be used. In the application of the literature method, the research goal should be taken as the basic guidance. Through the reading and combing of the literature content related to the protection of ceramic material and cultural heritage, it can provide necessary theoretical support for solving various key problems in the project. When applying the model method, it is necessary to build a feature collection model and a rapid verification model based on the blockchain technology, so as to realize the in-depth research on the protection mode of ceramic material cultural heritage and provide important support for the improvement of the feasibility of the project. When using the case analysis method, it is necessary to actively participate in the cultural relics excavation of Jingdezhen Yuyao site, So as to verify the feasibility of the project more comprehensively [5].

Digital collection and information database construction of Jingdezhen Ceramic intangible cultural heritage

The digital protection of Jingdezhen Ceramic intangible cultural heritage is the process of collecting, processing, storing, displaying, disseminating and sharing Jingdezhen Ceramic intangible cultural heritage through digital technology. Through a new interpretation perspective and preservation methods, give new connotation and significance to Jingdezhen Ceramic intangible cultural heritage [6], so that it can be permanently preserved and protected, and realize the protection and inheritance of intangible cultural heritage. The use of blockchain technology and digital technology can provide a new space for the preservation, display and dissemination of Jingdezhen Ceramic intangible cultural heritage. The intangible cultural heritage of taoce in Jingdezhen is essentially a kind of living culture, and the cultural connotation contained in it is expressed through various human activities [7]. Therefore, in the actual process of digital information collection based on blockchain technology, we should pay more attention to Jingdezhen ceramic culture, traditional hand-made ceramic technology and innovative application of ceramic culture. In the actual collection stage, we should pay more attention to the impact of cost, policy and other contents on the collection of those

missing skills, there are still some firewood kilns in Jingdezhen, but most of these firewood kilns have the nature of performance, so we need to focus on the data collection of this part of technology [8]. We can use the way of link simulation and reproduction and post production, so as to more truly restore the details of various processes, and fundamentally improve the digital protection content of intangible cultural heritage. In terms of technology, various technical measures such as three-dimensional scanning, digital photography and digital image processing can be adopted to effectively transform all kinds of things related to Jingdezhen Ceramic intangible cultural heritage into digital text, video or audio content that is easy to store, and digital simulation can also be carried out for some art works. From the perspective of actual development, the classification, filing and storage of digital resources are the main measures to protect intangible cultural heritage [9]. On the basis of standardized collection and processing in the early stage, it is necessary to combine different ways and categories to build a secondary digital resource database. In terms of resource content, it can be divided into technology library, product library, document library and other contents. In terms of resource types, it can be divided into text library, audio library and virtual library. In the subsequent practical stage of building digital resource library, we should focus on the diversity of data information library, and try to ensure the balance in terms of resource types, in order to enrich those digital resources with visual and intuitive characteristics. In addition, the basic function design of the resource database mainly includes the upload and download of resources, format transcoding, resource management and other aspects, in which the internal data information can be added or modified at will, so as to provide a more excellent digital resource database for the intangible cultural heritage of Jingdezhen ceramics, which is convenient for subsequent storage or reference [10].

VI. CONCLUSION

As there is no unified standard for porcelain, it is difficult to distinguish the true from the false, and the proliferation of counterfeit goods has seriously affected the brand premium of the porcelain industry, the Jingdezhen ceramic market has also become a fake depression, and the intangible cultural heritage of porcelain has been damaged, resulting in the inevitable bottleneck of the traditional marketing model, and the digital innovation model also needs to be transformed and upgraded. Especially under the impact of the epidemic, ceramic enterprises are facing varying degrees of operation and financing difficulties. How to eliminate the false and retain the true and improve business trust has become the biggest pain point.

In the current process of social development, with the development of various modern technologies, the attention of all sectors of society to traditional technologies is also increasing. It is precisely due to the rapid development of digital technology that it also provides a broader space for the protection of Jingdezhen ceramic material and cultural heritage. Through the application of blockchain technology, the corresponding digital archives can be established, It can also bring great convenience to the follow-up protection of various cultural relics.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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Yang Lisha is a lecturer at the School of Art and Archaeology, Jingdezhen Ceramic University, Jingdezhen City, Jiangxi Province, 333403, China. Yang Lisha's research interests include Ceramic Cultural Heritage.