

Research on Innovation of Diffusion Mechanism of Intangible Cultural Heritage in the Context of Meta-Universe

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ABSTRACT

In the context of the current state actively promoting the protection and inheritance of intangible cultural heritage, it is of great importance to explore the impact of emerging digital platforms on the dissemination of intangible cultural heritage. With the rapid development of digital economy, traditional intangible cultural heritage is faced with many challenges such as limited transmission scope and single transmission mode. Through the case analysis of China's intangible cultural heritage, this paper explores the application strategy of the meta-universe. Through digital reconstruction, digital twin, VR, AR and regional chain and other technologies, intangible cultural transmission is not limited by time and space for effective communication. Combined with the subjective factors faced, finally explore the innovation path of communication mechanism.

KEYWORDS

Intangible Cultural Heritage; Metaverse; Digital Reconstruction.

1. BACKGROUND AND SIGNIFICANCE OF META-UNIVERSE AND INTANGIBLE CULTURAL HERITAGE

1.1. The Rise and Development of the Meta Universe

The meta-universe originated in 1992, first proposed by American science fiction writer Neil Stephenson in the novel *Snow Crash* (Yu Guoming, Geng Xiaomeng, 2022), describing a parallel world that breaks through the real world, it is composed of countless grid of three virtual Spaces, people can live in the virtual space with their Avatar through VR equipment. Engage in social entertainment and business activities. With the development of science and technology, the meta-universe is constantly evolving. At first, simple prototypes were two-dimensional web and online games, such as Linden Lab's *Second Life*; Subsequently, with the rise of virtual reality technology, people began to understand the meta-universe from multiple dimensions and began to combine virtual reality with the meta-universe. Then to the application of blockchain technology, "connecting the dots" technological innovation, a real digital economy and social platform was born.

With the subversive revolution and breakthrough innovation of the new generation of digital intelligence media technology represented by Web3.0 technology, spatial interaction technology and AIGC technology, the meta-universe is gradually evolving into a foreseeable future media, marking the coming new era of digital civilization and creating an unprecedented opportunity for the dissemination of intangible cultural heritage (Zhan Yihong, Dong Tian, 2024). With the help of the construction of virtual and social communication channels, the limitations of time and space can be broken, so that intangible cultural heritage can be more widely disseminated in the meta-universe environment. At the same time, the emergence of new formats such as virtual art exhibitions and

digital collections can form cultural resonance for cross-border cooperation and brand building through cooperation with different fields, and further enhance the appeal and influence of intangible cultural heritage (Sun Rong, Sun Chen, 2024).

As a new generation of Internet, meta-universe integrates artificial intelligence, virtual reality, blockchain and other technologies to provide users with a new form of social interaction. The meta-universe will set off a change in the connection level between the real world and the virtual world, and promote the deep integration of the two. Through this integration, a new world with higher dimensions, different from the real world, will be built, which describes and Outlines the ideal shape and development vision of the future society.

1.2. Dilemma of Inheritance of Intangible Cultural Heritage

Intangible cultural heritage, as the crystallization of the collective wisdom of the Chinese nation and the precious heritage of historical civilization, carries rich cultural connotations. However, in the context of the country's vigorous development of intangible cultural heritage, the protection of intangible cultural heritage has achieved great results. However, with the rapid development of society, the inheritance of intangible cultural heritage still faces many difficulties, which needs our attention and development.

1.2.1. Limited Transmission Range

The popularization of intangible cultural heritage faces many challenges, which makes it difficult to be known by the public. From the perspective of geographical distribution, many intangible cultural heritage projects have strong local characteristics and are often limited to specific areas. For example, the traditional music, dance and handicraft skills of some ethnic minorities have encountered great obstacles in the process of cross-regional dissemination due to differences in language and customs. Although such cultural expressions enjoy great popularity and are passed down from generation to generation, once they leave their native environment, they become little known and their influence is greatly limited. In terms of transmission channels, although the traditional mode of oral communication helps to maintain the authenticity and integrity of cultural heritage, it is inefficient and has relatively small coverage. In the information age, although the Internet provides a broader platform for cultural dissemination, many intangible cultural heritage projects have yet to make full use of this advantage. On the one hand, some heirs of intangible cultural heritage lack Internet thinking and technical ability, and do not know how to carry out effective communication through the Internet. On the other hand, the contents of some intangible cultural heritage are relatively traditional and simple, and there is a certain gap with the needs of modern network communication, which is difficult to attract the attention of most netizens. In addition, the mainstream media has relatively little coverage and promotion of intangible cultural heritage, resulting in a low exposure rate of intangible cultural heritage in the mass media, further limiting its spread.

1.2.2. Single Transmission Mode

At present, the single mode of intangible cultural heritage communication is difficult to meet the diverse needs of various audience groups. Nowadays, the forms of communication mostly stay at the level of traditional display and explanation. For example, some exhibitions often simply display intangible cultural heritage works with simple text descriptions, and the audience can only passively listen to them, lacking participation and interaction. This single transmission makes the audience more boring and difficult to have a deeper understanding of the unique connotation of intangible cultural heritage. In addition, in terms of communication content, it often focuses on the technical presentation and history introduction of intangible cultural heritage projects, ignoring the integration with modern life, which leads to the audience thinking that intangible cultural heritage is detached from life and reduces their interest and attention.

1.2.3. Deviating from Actual Requirements

In the process of inheritance and development, many intangible cultural heritage items do not take into account changes in market demand, and are still produced and operated in accordance with traditional models. The design and production style of some traditional handicrafts is relatively old, unable to meet the needs of modern consumers in fashion, beauty, practicality and other aspects, and lack of innovation and market awareness, which leads to a small market share of intangible cultural heritage products and low economic benefits. At the same time, the protection and inheritance of intangible cultural heritage need to adapt to the development of modern society. With the acceleration of urbanization and the change of people's living environment, the soil for the survival of some intangible cultural heritage projects is gradually disappearing. In this case, it is necessary to adjust and innovate the intangible cultural heritage in time to better integrate into modern social life and realize the sustainable development of the intangible cultural heritage.

1.3. Digital Reconstruction of Intangible Cultural Heritage

Digital transformation, also known as digital transformation, is the process of integrating the next generation of ICT (Information and Communications Technology) into all areas of the business. Digital transformation is a new generation of ICT technology as a new factor of production, superimposed on the original elements of technology, thus causing cultural innovation and reconstruction (Liu Guoqiang, 2023). However, human society has entered the era of digital survival, and digitalization has brought about the underlying reconstruction of human ecology, and the changes in connection, rules, and time and space have also profoundly affected intangible cultural heritage.

Digitization is based on the Internet of everything, and the essence is to realize cross-border reconstruction with the help of big data. Through sensors, cloud computing and other technologies, the traditional handicraft production process and participant behavioral information related data are integrated into the cloud for data analysis, data sharing and interaction are realized, and the intangible cultural heritage is closely connected with modern life. When a bridge is built, people's activities and cognitive scope will change, intangible cultural heritage will no longer be limited to a specific region and time, and the dissemination will be more rapid and efficient.

The reconstruction of rules by digitalization also affects the field of intangible cultural heritage. In the era of digital economy, changes in the consumption end have prompted changes in the rules of the intangible heritage industry. The change from standardization to customization in production requires the intangible heritage industry to change from traditional production mode to on-demand manufacturing and flexible manufacturing.

Nonlinear narrative mode and cutting-edge technologies such as digital twins and meta-universe are profoundly and extensively reshaping the pattern of inheritance and development of intangible cultural heritage, opening up a new path for its presentation and inheritance. The non-linear narrative mode breaks through the traditional narrative frame and realizes the organic combination of intangible cultural heritage elements in different time scales. Weibo, wechat and email compress our time and space into the network, abandon the single way of brief development in chronological order, and adopt a multi-dimensional and multi-clue narrative structure, so that the audience can realize the survival state of intangible cultural heritage across time and space in the "present" moment.

2. THE PRACTICE AND CHALLENGES OF CHINA'S META-UNIVERSE

2.1. Digital Policy Background of China's Intangible Cultural Heritage Protection

In the process of promoting the digitalization of intangible cultural heritage in China, the reference of meta-cosmic technology has become an important component element. Through the Opinions on Promoting the High-quality Development of the Digital Cultural Industry, the government clearly

points out that it will promote the deep integration of the digital cultural industry and traditional culture, and encourage the innovative transformation and development of intangible cultural heritage through the use of digital technology. The introduction of these policies has promoted the integration of science, technology and culture, and enhanced the global influence of intangible cultural heritage.

2.2. Practice Cases of China's Intangible Cultural Heritage Protection in the Meta- Universe

With the continuous development of meta-universe technology, China actively explores the application of meta-universe to the field of intangible cultural heritage protection, and has achieved a series of innovative and exemplary practical achievements, among which the most outstanding is the "intangible cultural heritage Museum" project, which restores the birth scene of intangible cultural heritage technology and technical demonstration through AR and VR technology, so that users can experience it. These immersive experience pavilions demonstrate the cultural value of intangible cultural heritage, attract international users through digital platforms, and expand the influence of China's intangible cultural heritage. The intangible cultural heritage Museum project not only breaks the restrictions of time and space, so that more people can enjoy the essence of folk culture anytime and anywhere, but also enhances the audience's sense of participation and immersion through interactive experience, and improves the transmission effect of folk culture.

In addition to the intangible cultural Heritage museum project, China has also made remarkable achievements in traditional art performances, with opera troupes working with technology companies to introduce traditional opera performances into the meta-universe. Through high-definition photography, motion capture and virtual scene construction and other technologies, the wonderful performances of opera actors are presented to the audience in a new form. The audience can feel the charm of the opera by wearing VR devices or watching on the computer. At the same time, they can choose their own viewing Angle, and carefully observe the actor's facial changes, body language and clothing characteristics. During the process, it also supports interaction with others to share feelings and insights about the performance.

In addition, local authorities have promoted a series of applications for intangible cultural heritage through digital platforms. Taking Fujian Province as an example, the province has integrated its rich intangible cultural resources and developed the wechat mini program "Fujian Intangible Cultural Heritage", through which users can obtain detailed introduction of intangible cultural heritage projects, information about inheritors, location of field exhibition centers and guides for tourism activities related to intangible cultural heritage. In addition, the mini program also displays creative goods based on the local culture of Fujian, helping users to better understand the cultural values behind these products.

These practical cases show that China has made certain achievements in the protection of intangible cultural heritage in the meta-universe, and by combining the meta-cosmic technology with the protection of intangible cultural heritage, a new way has been opened up for the inheritance and development of intangible cultural heritage.

2.3. Features and Challenges of China's Meta-Cosmic Intangible Heritage Protection

2.3.1. Characteristics of China's Meta-Cosmic Intangible Heritage Protection

Combine technological innovation with cultural inheritance. The immersive virtual environment built with the help of virtual reality technology can highly restore the historical scenes and technical processes of intangible cultural heritage, so that the audience can experience its unique charm as if they were in the birthplace of intangible cultural heritage. By combining virtual intangible cultural heritage elements with real scenes, augmented reality technology enables people to perceive the

existence of intangible cultural heritage anytime and anywhere in their daily life environment, which greatly expands the dissemination scope and display form of intangible cultural heritage. With its immutable and traceable characteristics, blockchain technology provides a reliable guarantee for the copyright protection and transaction circulation of intangible cultural heritage digital assets, and ensures that the legitimate rights and interests of intangible cultural heritage resources are effectively safeguarded.

Emphasis on interaction and participation. The meta universe emphasizes user interaction and participation, which has been fully demonstrated in China's meta universe intangible heritage protection practice (Zang Danning, 2024). By building diversified interactive platforms and immersive experience scenes, it creates rich participation opportunities for users, so that they can actively integrate into the protection and inheritance of intangible cultural heritage. On the meta Universe experience platform, many interactive links are designed so that users can make intangible heritage works by themselves; By setting up interactive games related to intangible cultural heritage, such as folk culture quiz and skill simulation challenge, users can become active participants from observation (Srdanović P ,Skala T, 2024).

Diversified application scenarios. In addition to the traditional form of virtual exhibition, the meta-universe technology has penetrated into many fields such as education and tourism, opening up a broader space for it. Whether it is building virtual classrooms in the field of education, showing intangible cultural heritage knowledge and skills to students more vividly, or interacting with virtual characters in the field of tourism, understanding the behind story and historical and cultural background, it is no longer narrow, and using the "culture +" way to help inherit the new era.

2.3.2. Challenges Faced by China's Meta-Cosmic Intangible Heritage Protection

Technical bottleneck and talent shortage. Although metaverse technology is undergoing a rapid development phase, it still faces several technical challenges. In order to enhance its application in the protection of intangible cultural heritage, issues to be solved include improving the clarity, user experience comfort and interactive performance of virtual reality devices, and further optimizing the capabilities of artificial intelligence in emotion recognition and natural language processing. At the same time, there is a significant shortage of professionals in this field, especially those with interdisciplinary knowledge background, which not only limits the pace of technological innovation, but also brings additional difficulties to the implementation and maintenance of related projects. Therefore, in the process of promoting the application of meta-cosmic technology in the protection of intangible cultural heritage, overcoming technical obstacles and making up for talent gap have become the dual tasks that need to be solved urgently.

Content quality and copyright protection. The successful construction of the platform has allowed a large amount of data to emerge and promoted the extensive dissemination and inheritance of intangible cultural heritage. Behind this, many deep-seated problems emerge, and some intangible cultural heritage digital content has relatively serious quality defects, showing a lack of depth and accuracy. Driven by interests, the creators are eager to realize commercial traffic, and do not adopt a rigorous attitude towards intangible cultural heritage, so that the intangible cultural heritage is excessively one-sided, entertaining and commercialized, in order to meet the superficial needs of the audience. This kind of improper creation seriously destroys the integrity and seriousness of intangible cultural heritage, distorts the rich connotation and core value of intangible cultural heritage, and deviates it from the original cultural track in the process of transmission, making it difficult to truly realize the goal of inheriting and promoting intangible cultural heritage.

Social cognition and acceptance need to be improved. Given the novelty and complexity of its technology, there are also many doubts about the safety and reliability of the metaverse. Some people still insist that intangible cultural heritage should follow the protection concept of traditional inheritance, and believe that the inheritance of skills needs to pass the test of time, which is the only choice to protect the authenticity of intangible cultural heritage. This kind of thinking has caused

obstacles to the inheritance of intangible cultural heritage and contradicts the intervention of science and technology. There are also traditional people who worry that new technologies will destroy the original ecology of intangible cultural heritage, and thus weaken the cultural value and historical significance. In addition, the meta-universe needs to rely on the computer base, the use of the process often involves high-tech equipment, the need to have a certain operational knowledge, which undoubtedly gives a threshold for non-genetic successors, for the elderly and vulnerable groups, this obstacle is particularly prominent. Therefore, how to improve the level of social cognition and enhance the degree of acceptance has become an important topic of cultural protection.

3. THE STRATEGY OF INTANGIBLE HERITAGE PROTECTION PATH IN THE METACOSMIC ERA

3.1. Optimize the Application of Meta-Universe Technology in Intangible Heritage Protection

The intangible cultural property market economy system is expanding year by year, with great potential for development. To maximize the benefits of realistic communication, it is necessary to optimize the application of metacosmic technology, and pay attention to the collaborative development of NFT technology and other metacosmic technologies, such as AR, VR, AI, etc. New technologies are used to provide a more immersive display space for digital assets in the form of NFT, and intelligent analysis and prediction of the NFT market are realized with the help of AI to provide data support for intangible digital assets, so as to form a more complete and efficient meta-universe intangible cultural heritage protection technology system (Huang Yuan, Liang Yiyang, 2024).

Blockchain and NFT technology need to focus more on the protection of intangible cultural heritage and continue to expand. For example, the social nature of NFT will play an important role in promoting the dissemination of intangible cultural heritage. NFT is circulated among people from different regions and different cultural backgrounds, and the collections and transactions of different users can be displayed on social media platforms to arouse more people's attention and discussion, attract potential users to enter the field of meta-cosmic protection, and promote cross-cultural dissemination of intangible cultural heritage.

3.2. Establish a Multi-Party Cooperation Mechanism

The construction of multi-party cooperation mechanism is the key to realize the effective application of meta-universe technology in the protection of intangible heritage. The government should play an active role in guidance and supervision, and provide policy support and legal guarantee for promoting the protection of meta-cosmic intangible cultural heritage by formulating relevant policies and regulations. Especially in backward areas, the government needs to set up special support funds, encourage enterprises and institutions to carry out meta-cosmic intangible cultural heritage protection projects, introduce preferential tax policies, reduce the operating costs of relevant enterprises, and ensure that various intangible cultural heritage skills can be effectively inherited (Oladokun D B ,Ajani A Y, 2024).

It is also crucial to cooperate with scientific research institutions and universities, which will deeply study the technical solutions suitable for intangible heritage protection such as digital modeling accuracy and virtual scene interactivity, carry out relevant types of academic research, explore the theoretical basis and development model of meta-cosmic intangible heritage protection, and provide theoretical guidance for practice. Such cooperation can not only enrich the transmission of intangible cultural heritage, but also provide a new path for cultural inheritance and protection through diversified means.

International cultural exchange plays an important role in the practice and promotion of the meta-cosmic intangible heritage protection. The meta-universe platform itself has the characteristics of breaking the limitation of time and space, and carries out communication through various channels to achieve cross-cultural communication (Buragohain D ,Meng Y ,Deng C, 2024). International organizations should also establish a correct concept, better understand the cultural characteristics of other countries through cultural exchanges, reduce prejudice and discrimination, and establish a relationship of mutual respect. International cultural exchange is a two-way process, which can not only enrich our life experience, but also promote the progress and development of human society. We should actively participate in it and contribute to building a more harmonious and beautiful world.

3.3. Digital Twins and Intangible Heritage Protection

3.3.1. Digital Twin Conceptual Model of Intangible Heritage Protection

Guided by the concept of the meta-universe and based on digital twin technology, the museum integrates advanced concepts such as intelligent manufacturing, Industry 4.0, industrial Internet, and smart city, and emphasizes the complementarity of the digital virtual world and the physical real world (CHENG Qiaoming, 2024). The technical barrier of the intangible cultural heritage exhibition hall is the meta-universe technology, but the context of the intangible cultural heritage exhibition hall is still the various skills of the intangible cultural heritage, the purpose of the exhibition hall is still to reproduce the cultural attribution and skill display, starting from the foundation, integrating scene data, building a virtual world, and realizing the service system of mobile APP. These four modules of the intangible cultural heritage exhibition Hall are shown in Figure 1.

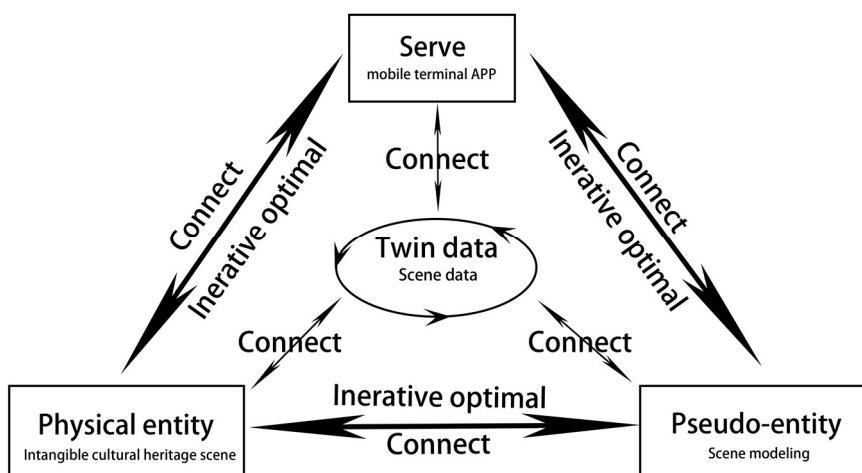


Figure 1. Digital twin concept map for intangible heritage protection

3.3.2. Application of Digital Twin Technology in the Field of Intangible Heritage

The inheritance and development of intangible cultural heritage are often closely related to specific historical and cultural scenes. The digital twin technology can precisely replicate these scenes, creating an immersive feeling for people. Through field investigation, historical data collection and on-site measurement, the spatial layout, architectural style, environmental elements and other information of the scene are obtained. Virtual reality and augmented reality technology are combined with digital modeling to establish an almost identical digital empire in the virtual world. Such high-precision reproduction not only helps people understand the development of its history, but also provides concrete digital teaching resources for intangible cultural heritage education.

3.4. Construction and Development of Offline Museums

The philosophical idea of the meta-universe is to enhance, enrich and perfect the real world, and the so-called "virtual reality" is not only virtual but not real. The idea of virtuality and reality is to make the communication of intangible cultural heritage establish the connection of the underlying mental system of the brain. The virtual world, as a bidirectional world derived from the real world, has its own part of the subjective conception of the human body, so that the intercommunication between the two is the result of the meta-universe technology. As the digital world continues to evolve, it will gradually lose its original senses. Through the establishment of offline museums, the virtual world will not deviate, making it the fundamental foothold of intangible cultural heritage.

4. CONCLUSION AND PROSPECT

4.1. Future Development and Outlook

"Meta-universe" is a "virtual and real interaction, multiple openness and human-computer integration with the real world mapping, interactive and non-representational science fiction world" created by digital technology. As the future development technology of cultural inheritance, the meta-universe will become more diversified with scientific and technological innovation, and through the integration of more series of technologies, the digital intangible cultural heritage database covering audio, video, images, text and other forms can be virtualized, bringing more possibilities for cultural inheritance.

Cross-cultural communication will play a crucial role in the development of the future meta-universe. By attracting people from different countries and regions with different cultural backgrounds to participate in the protection and inheritance of cultural heritage, attention is paid to the accurate transmission of the connotation of intangible cultural heritage and its international expression. This will not only help these valuable cultural heritage to be recognized and accepted by a wider audience across linguistic and cultural boundaries, but also help to narrow the differences in development between countries and ensure that all cultures around the world can be treated equally and effectively protected.

In general, in the context of today's rapidly changing times, the meta-universe provides a unique and valuable opportunity for the inheritance and development of intangible cultural heritage. However, in order for these cultural elements to be preserved and continue to flourish in the virtual world, there are many challenges that need to be coordinated and integrated to ensure that intangible cultural heritage not only survives in the digital age, but also develops in a healthy and sustainable way, thereby contributing to the preservation and enhancement of cultural diversity worldwide.

4.2. Conclusion

From the perspective of meta-universe technology, this paper analyzes the internal logic between meta-universe and the development of Chinese intangible cultural heritage, and holds that meta-universe technology is the key technology of cultural transmission. Through the integration of multiple technologies, the essence of China's development can be eliminated and high-quality dissemination of intangible cultural heritage can be realized. Advocating the use of scientific and technological innovation to develop intangible cultural heritage will take advantage of the vitality of the digital industry market to promote the innovative development of intangible cultural heritage. However, many challenges still need to be faced, and we need to make multiple efforts to improve the diversity of the meta-universe, which will promote the public's cognition and understanding of intangible cultural heritage, and create conditions for its inheritance and development.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest between and among the authors.

ACKNOWLEDGEMENTS

This study is funded by the research project of Modern College of Northwest University and Xi'an International Studies University: "Research on innovation of diffusion mechanism of intangible cultural heritage in the context of meta-universe "

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