

Innovative Pathways for the Digital Dissemination of Intangible Cultural Heritage in the Metaverse Context: A Case Study of Jiaodong Huabobo

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Abstract: The emergence of metaverse ideas and the continuous advancement of digital technologies have brought about the arrival of a brand-new phase for the digital dissemination of ICH. Taking the Shandong provincial-level ICH "Jiaodong Huabobo" as the research object, this paper will investigate in detail the logic of digital translation in ICH based on the metaverse concept. Using the methods of literature reading, case study, and field investigation of Weihai City, this research pays close attention to the innovative application of advanced digital technologies like VR/AR, NFT (digital collections), and virtual community to solve some longstanding problems in traditional ICH communication such as geographical restrictions, fragmented audiences, and limited form of communication. Based on the successful experience gained from the Huabobo industry in Wendeng District of Weihai City, we put forward a three-dimensional innovative model for ICH's digital transformation, covering content creation, communication channel, and audience participation.

Keywords: Metaverse; Digitalization of Intangible Cultural Heritage; Jiaodong Huabobo; Communication Innovation; Immersive Experience

1. Introduction

Intangible cultural heritage is a very significant element of the remarkable traditional culture of China, and the core of regional identity. Within the context of the development of the digital era and rural revitalization strategy, there has been increasing attention on utilizing the potential of emerging technologies for the revitalization of intangible cultural heritage, which has emerged as one of the most popular topics within academic circles. Metaverse is formed using

technologies like virtual reality (VR), augmented reality (AR), and blockchain, providing an innovative stage for ICH dissemination in the form of digital collection (Digital Collection), database, VR game, and character of Intellectual Property (see [3]). Jiaodong Huabobo refers to a distinctive folk art of dough sculptures unique to Jiaodong Peninsula, including cities such as Yantai and Weihai and nearby areas, which reflects the historical memory of fishing culture and agrarian civilization. Known for its bright colors, large size, and artistic value, its dissemination has been restricted by many factors such as geography and generation, which makes the application of metaverse technology a promising breakthrough. In this study, we explore the integration of metaverse technology and the dissemination of Jiaodong Huabobo.

2. Core Concepts and Theoretical Foundations

The metaverse represents the complete application of current cloud computing, blockchain, distributed storage, IoT, VR, AR, artificial intelligence, and other modern digital technologies to eventually create a "virtual world derived from or beyond the real world that interacts with the real world" (refer to [3]). In the case of ICH communication, it takes the form of an immersive cultural experience space. the digital dissemination of ICH entails the act of collecting, archiving, presenting, and interacting with ICH resources via digital technologies. As an "edible handicraft," Jiaodong Huabobo consists of over ten steps of processing, including kneading, rolling, pinching, cutting, tracing, among others. the highly experiential nature of Jiaodong Huabobo makes it highly translatable digitally.

This study is grounded in media convergence theory and immersive communication theory. Media convergence theory is one of the main

theoretical frameworks in the evolution of the information age media, whereby various media have come together through technology and other aspects to develop more efficient and diversified communication structures (refer to [9]). Media convergence is a framework where there is no demarcation between different types of media, hence the transition of ICH from being oral transmission to omnimedia communication. Immerse communication theory stresses the promotion of the audience's consciousness transfer within virtual environments, giving the feeling of physical presence among the audience. One key factor of this theory is the blending of multi-sensory information, moving beyond the two-dimensional communications, which is facilitated by VR, AR, MR (Mixed Reality) technologies to enable simultaneous stimulating of vision, hearing, and touching (refer to [10]). This theory considers that the collective sensory and emotion experience of the audience will contribute to its realization of the "sense of presence" of the metaverse. It is possible to construct virtual places like the "Huabobo Town" and create digital copies of folk cultural signs such as "Sacred Insect" and "Joyful Reunion".

3. Current Status and Bottlenecks of Digital Dissemination of Jiaodong Huabobo

During the last decade, there has been explosive development within the Jiaodong Huabobo industry. As an illustration, in the city of Wendeng in Weihai, which is located next to Yantai, in 2023, the output value was higher than 500 million RMB, it employed 11, 000 people, and the industrial model developed by it became "leading enterprises+cooperatives+farmers" (please see [1]). When we talk about dissemination, the Huabobo product changed from traditional gifts used for festivities and sacrifices into "gourmet gifts" and "cultural tourism commodities." Despite these achievements, deep-seated contradictions remain in the dissemination process of Jiaodong Huabobo. First, there are barriers of geography and generational divides. Although e-commerce has expanded sales, cultural influence remains largely concentrated in the Jiaodong area, with limited appeal to southern markets and younger demographics. Second, there is the issue of monotonous presentation and diluted content. Existing digital dissemination remains mostly at the e-commerce

level, and problems such as low participation of young creators, weak account operation interactivity, and polarized communication effects (see [4]) indicate a lack of in-depth digital interpretation of folk symbols like "Sacred Insect" and "Joyful Reunion" (see [3] [7]), resulting in the dilution of cultural connotations.

Therefore, to address the bottlenecks of geographical limitations, audience fragmentation, and monotonous presentation in traditional ICH dissemination, we need to innovate and strengthen three dimensions: content production, communication channels, and audience participation.

4. Digital Practice Pathways for Jiaodong Huabobo in the Metaverse Context

By means of digital twins technology, a digital replica of the Jiaodong Huabobo town is possible. Using 3D models to recreate traditional folk architectures and activities, visitors may explore the virtual world by means of VR headsets or mobile devices in order to visit the historical and cultural Huabobo exhibition hall and observe the entire process of intangible cultural heritage inheritors, starting from kneading dough until steaming. For instance, the Four Seasons Huabobo virtual scene can be created, wherein swallow-shaped Huabobo in spring will be presented to symbolize the rebirth of nature, while ingot-shaped Huabobo during Spring Festival to wish for good fortune.

Based on Web3.0 network technology, a virtual workshop can be designed for users to design their own avatars. With the help of an online tutor, namely the AI digital human, they will be able to simulate the experience of kneading and shaping the dough by means of haptic devices, thus experiencing the feeling of "cloud-making" Huabobo. Meanwhile, traditional patterns like the "Sacred Insect" and "Dragon and Phoenix Auspiciousness" can become digital art collections (NFT). By following the current trend, one may design limited editions of the "Huabobo Mystery Boxes," in which case the user buys a digital piece while also receiving the physical item. This kind of "virtual-real linkage" communication effect has been proved popular among young people in other countries such as the USA, Japan, and Canada ([3]).

5. Innovative Strategies for Digital Dissemination of ICH

As for the production level, AI technology can be applied to interpret the images of Jiaodong Huabobo. This could be achieved by establishing a library of "Huabobo Symbols, " whereby traditional aesthetic aspects such as "Joyful Reunion" compositions and "Five Colors" theory are digitized. With pop culture including "Guochao, " "anime, " and VR games utilizing user interface designs favored by youth (as illustrated in [3]), youth-driven content creation can be realized. Furthermore, cross-border products such as "North-South Culture Fusion Gift Boxes" will ensure circulation outside of Jiaodong, hence ensuring local content creation of ICH.

The construction of the communication channel shall have a three-dimensional channel system formed by "the online metaverse platform+the offline experience workshop+the e-commerce platform, " thus forming a multi-dimensional online and offline sales model (see [6]). the online channel includes organizing the "Cloud Huabobo Festival" in the metaverse. the offline channel includes setting up the XR (extended reality) Experience Zones in the scenic area, allowing users to scan physical objects and watch AR (Augmented Reality) animation explaining their culture. Algorithmic recommendations via the short video platform help distribute high-quality content in the metaverse.

In the context of audience interaction, it is important to involve the audiences actively in the content creation process. This will be achieved by creating a "Huabobo Designer" mini-program, whereby users have the freedom to experiment with color and shape combinations to create virtual content; best designs would be prototyped and converted into physical forms at offline workshops. Besides that, a digital inheritor badge reward system could also be developed, whereby the users are rewarded in points upon studying, creating, and sharing; such points could be exchanged for cultural heritage tours or prizes.

6. Conclusion and Outlook

The metaverse has many possibilities for the dissemination of ICH in the digital environment. Through Jiaodong Huabobo as an example, this article suggests that innovative approaches, such as creating immersive experience via metaverse technologies, creating digital products, and participating in co-creation, are feasible.

Looking to the future, we should continue to support the deep fusion of "ICH+art (tourism)"[2] , supported by digital technologies. With the help of digital technology, ancient Huabobo can be rejuvenated in the spirit of the new era.

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