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Digital Pathways for Jingdezhen Ceramic Techniques from the Perspective of Intangible Cultural Heritage Revitalization

Wenyan Zhao [1], Chenyu Zhang [2]

[1] School of Design and Art, Jingdezhen Ceramic University, Jingdezhen Jiangxi, 333403, China
[2] Graduate School, Jingdezhen Ceramic University, Jingdezhen Jiangxi, 333403, China

Abstract: Jingdezhen has a porcelain-making history spanning over 2,000 years, forming a complete craftsmanship system with traditional handcrafted porcelain-making techniques as the core and a unique cultural tradition. It is an important representative of China's traditional handcraft-based intangible cultural heritage (ICH). For a long time, this craftsmanship has been passed down through the master-apprentice system and local practices, but in the context of modern society, it faces practical dilemmas such as the aging of inheritor groups, a single mode of communication, and insufficient contemporary expression. With the development of digital technology, the way of inheriting ICH has undergone profound changes. Based on the perspective of ICH activation, this paper takes Jingdezhen ceramic craftsmanship as the research object. On the basis of analyzing its cultural value and current inheritance status, it sorts out the existing problems in current digital protection and communication practices, such as inadequate technological adaptation, restricted transformation of tacit knowledge, and low inheritance efficiency. Furthermore, it systematically explores the construction of digital paths for Jingdezhen ceramic craftsmanship from three dimensions: digital protection, digital communication, and digital innovation. The research aims to provide theoretical reference and practical enlightenment for the living inheritance and sustainable development of Jingdezhen's ICH ceramic craftsmanship.

Keywords: Intangible Cultural Heritage (ICH); Jingdezhen Ceramic Craftsmanship; Digitization; Living Inheritance.

1. Introduction

Against the backdrop of the continuous advancement of Chinese-style modernization, the contemporary expression and sustainable inheritance of intangible cultural heritage (ICH) have become important issues in cultural modernization. At the national level, policy documents such as the "Opinions on Further Strengthening the Protection of Intangible Cultural Heritage" have been successively issued, clearly stating that protecting and inheriting ICH is of great significance for continuing historical context and strengthening cultural confidence. As a core representative of China's ceramic civilization, Jingdezhen ceramic craftsmanship carries unique technological wisdom and profound cultural connotations. Its complete process system and exquisite techniques serve as an important material carrier of Chinese civilization. However, the traditional inheritance model dominated by the master-apprentice system is facing practical dilemmas such as the shrinking of inheritor groups, limited communication scenarios, and the endangerment of some techniques. In recent years, the rapid development of digital and intelligent technologies has injected new vitality into ICH activation. Technologies such as artificial intelligence (AI) and virtual reality (VR) have provided new possibilities for the recording, communication, and innovation of Jingdezhen ceramic craftsmanship due to their wide coverage and high application efficiency. Nevertheless, existing digital practices still have problems such as inadequate adaptation between technology and craftsmanship, difficulties in transforming tacit knowledge, and one-sided presentation of cultural connotations. Therefore, exploring the digital paths of Jingdezhen ceramic craftsmanship from the perspective of ICH activation is not only a practical response to its inheritance dilemmas but also provides useful reference for the modern transformation of traditional craft-based ICH. [1]

2. Attribute Connotation and Value Interpretation of Jingdezhen Ceramic Craftsmanship from the ICH Perspective

As an important representative of China's traditional handcraft-based intangible cultural heritage, Jingdezhen ceramic craftsmanship is a composite craftsmanship system formed through long-term historical evolution. Its core attributes and multiple values jointly constitute the theoretical basis for ICH protection and inheritance, and also embody the basic characteristics of ICH as "people-oriented and living continuity".

From the perspective of ICH attributes, Jingdezhen ceramic craftsmanship first presents distinct characteristics of living inheritance. This craftsmanship cannot be fully reproduced through standardized texts or static displays, but is highly dependent on the practical experience and situational judgment of practitioners. The control of force during clay kneading, the grasp of thickness during trimming, and the perception of fire temperature and color during kiln firing are all based on long-term practical accumulation, and can only be passed on through master-apprentice interaction and repeated operations. This inheritance model centered on experience and practice keeps ceramic craftsmanship in a state of dynamic generation and continuity.

At the same time, Jingdezhen ceramic craftsmanship also has distinct cultural composite attributes. Its craftsmanship form has established close connections with regional ecological conditions, historical institutional structures, and social aesthetic concepts. For example, the use and formula

evolution of cobalt materials in blue and white porcelain reflect the influence of ancient trade systems; changes in vessel proportions and decorative patterns reflect social norms and aesthetic orientations of different periods; the exclusive application of kaolin further strengthens the local characteristics of the craftsmanship. The continuous interaction between craftsmanship practice and cultural context has made ceramic production transcend mere craft activities and become an important carrier of local cultural identity.

At the value level, Jingdezhen ceramic craftsmanship has constructed an intertwined multi-dimensional value system. In terms of cultural value, its complete process flow preserves rich historical information, making ceramic artifacts an important medium for carrying social memory and cultural symbols; in terms of technical value, the material cognition and process logic contained in traditional glazing and firing experience provide empirical reference for modern material research; in terms of social and ecological value, its production methods and craftsmanship ethics reflect the interactive relationship between humans and nature in traditional handicraft societies, and also have enlightenment significance for contemporary sustainable development.

It should be emphasized that the realization of these values has always relied on the living inheritance of the craftsmanship. The core of ICH protection is not the static preservation of craftsmanship forms, but the realization of their contemporary continuity through continuous practice and social interaction. This characteristic also lays a theoretical foundation for discussing the inheritance path of Jingdezhen ceramic craftsmanship from a digital perspective in the following sections. [2-3]

3. Current Status and Dilemmas of the Inheritance of Jingdezhen's Ceramic ICH

3.1. Current Inheritance Status of Jingdezhen's Ceramic ICH

In the contemporary ICH protection system, Jingdezhen ceramic craftsmanship still takes manual practice as the core. Its inheritors mainly include representative ICH inheritors, handcrafted porcelain artisans, and relevant practitioners. Inheritance activities are carried out in traditional kiln areas, folk workshops, and some colleges, universities, and cultural institutions. At the policy level, in March 2025, Jingdezhen officially issued the "Implementation Plan for the Construction of a National Cultural Relic Protection and Utilization Demonstration Zone for Jingdezhen Porcelain Industry Heritage in Jiangxi Province", and in May of the same year, the "Regulations of Jingdezhen City on the Protection of Porcelain Industry Cultural Heritage" was officially implemented. These provide institutional guarantees for the systematic protection and living inheritance of ceramic ICH from both legislative and planning dimensions. As of the end of 2024, public data show that Jingdezhen has more than 3,000 intangible cultural heritage inheritors at or above the municipal level, ranking among the top in key ICH areas nationwide, reflecting the local relative advantages in the number of inheritors and policy coverage.

In terms of inheritance methods, the master-apprentice system remains the main path for the continuation of porcelain-making craftsmanship. Key processes such as clay kneading, trimming, decoration, and firing are highly dependent on physical experience formed through long-term practice. The learning cycle is long, requiring repeated operations and comprehension in specific production scenarios. At the same time, some veteran artisans have actively expanded the scope of inheritance by setting up studios and training courses, allowing more apprentices to access core craftsmanship in practice. Colleges, universities, and vocational schools have also gradually incorporated porcelain-making craftsmanship into their teaching systems, providing institutional support for craftsmanship inheritance through curriculum practice, industry-university cooperation, and other forms. For example, the ceramic technology courses offered by Jingdezhen Ceramic University not only cover the operation of traditional processes but also introduce design innovation and process research, enabling students to acquire certain innovative capabilities while mastering basic craftsmanship.

At the institutionalized inheritance level, the masters of core craftsmanship are mainly middle-aged and elderly groups, while the young inheritance force is relatively limited. Some young practitioners are more involved in design, cultural and creative development, or market operations, and have insufficient long-term practical investment in complete processes. Although this generational distribution shows inheritance pressure, it also urges various educational institutions and social organizations to actively explore new models of youth participation, injecting new vitality into the continuation of the craftsmanship.

In terms of communication channels, Jingdezhen ceramic craftsmanship is mainly promoted through museum exhibitions, ceramic art experience workshops, and festival activities. In recent years, the integrated development of culture and tourism has provided more public spaces for craftsmanship display, such as ceramic expositions, ICH markets, and cultural tourism routes, allowing the public to experience the porcelain-making process through participation and experience. In addition, some inheritors use new media such as short video platforms and online courses to display their craftsmanship, expanding social influence.

3.2. Practical Dilemmas in the Inheritance of Jingdezhen's Ceramic ICH

Although Jingdezhen's ceramic ICH craftsmanship shows a certain positive momentum in terms of the scale of inheritors, educational system, and social participation, it still faces many prominent dilemmas in the process of practical development, restricting the living continuity of the craftsmanship. [4]

3.2.1. Intergenerational Gap in Inheritors, Core Craftsmanship at Risk of Loss

At present, most of the core processes of Jingdezhen ceramic craftsmanship are mastered by middle-aged and elderly inheritors over 65 years old. Especially for niche craftsmanship with high technical difficulty and low yield rate such as "bahua" (intricate incised porcelain decoration), very few artisans can master it proficiently, and they are generally advanced in age. In contrast, young apprentices have little willingness to systematically study complete processes. On the one hand, the learning cycle of porcelain-making craftsmanship is long, and the initial economic return is relatively low; on the other hand, many young people are more willing to engage in fields such as design innovation, cultural and creative development, or market operations,

resulting in scattered practical investment in core craftsmanship. This intergenerational gap directly puts some core craftsmanship at risk of "losing the art with the passing of artisans".

3.2.2. Difficulties in Transferring Tacit Knowledge, Low Efficiency of Experience Inheritance

Key techniques such as the control of hand feel during clay kneading, the precise proportioning of glazes, and the adjustment of kiln fire temperature all rely on the experiential judgment accumulated by inheritors through long-term practice. Such experiential knowledge is difficult to fully explain and teach through words, videos, or classroom teaching, and belongs to the content that "can only be sensed but not expressed in words". Even if veteran artisans teach through setting up workshops and training courses, they are limited by time, region, and students' acceptance ability, and there is still a risk of loss of core experience.

3.2.3. Limited Communication Channels, Insufficient Transmission of Cultural Connotations

From the perspective of communication, traditional communication methods have obvious shortcomings. Although museum exhibitions, ceramic art experience workshops, and festival activities can provide audiences with intuitive experiences, their coverage is limited and lack sustainability, making it difficult to reach cross-regional youth groups. While new media and digital platforms are quite popular—with views on topics related to "Jingdezhen ceramics" exceeding 10 billion—the content is mostly short-term observation and entertaining experiences. The cultural connotations and in-depth values behind the craftsmanship are not fully explored, making it difficult for audiences to truly understand the core charm of this craftsmanship.

3.2.4. Damaged Industrial Ecology, Lagging Innovation and Insufficient Market Adaptation

The superposition of dual dilemmas at the industrial level has seriously restricted the living inheritance of Jingdezhen ceramic craftsmanship. On the one hand, the practical living environment is continuously squeezed. Under the background of rapid urbanization and the development of tourism economy, some traditional kiln areas and folk workshops are facing demolition and reconstruction due to land development or market-driven factors, and some ancient processes are simplified or even replaced to control costs and improve efficiency; on the other hand, product innovation is lagging and disconnected from market demand. Many artisans adhere to traditional production habits, lack effective channels to access modern design concepts and insight into consumer needs, and the products produced still remain in traditional forms, which are difficult to meet contemporary aesthetics and consumption scenarios, resulting in low purchase intention among young consumers. The squeeze from the external environment and the lag in internal innovation overlap, which not only weakens the market competitiveness of the handcrafted porcelain industry but also makes the inheritance of craftsmanship lose sustainable industrial support, increasing the difficulty of living inheritance.

The interweaving of the above dilemmas not only highlights the urgency of innovating the inheritance model but also clarifies the core demand for technological empowerment, providing a practical realistic basis and a clear problem-oriented approach for constructing digital inheritance paths from the perspective of ICH activation in the following sections.

4. Digital Paths of Jingdezhen Ceramic Craftsmanship from the Perspective of ICH Activation

4.1. Constructing a Two-Dimensional Digital Resource Library

To address practical dilemmas such as the concentration of craftsmanship masters in middle-aged and elderly groups, insufficient participation of the younger generation, and difficulties in transferring tacit knowledge, digital protection has become a basic path for the living inheritance of handcrafted porcelain-making craftsmanship. Supported by digital technology, it is possible to break through the information fragmentation of traditional recording methods and achieve comprehensive preservation of craftsmanship operations, artifact forms, and cultural contexts.

3D laser scanning technology can perform high-precision modeling of ancient ceramic artifacts, traditional kilns, and porcelain-making tools, accurately restoring their morphological details and structural characteristics, and providing standardized digital archive resources for subsequent research and teaching; motion capture and biosensing technologies can real-time record hand movements, posture changes, and force parameters in key processes such as clay kneading and trimming, transforming the "inexpressible" tacit experience into a quantifiable and traceable knowledge system; on this basis, combined with eye-tracking technology and in-depth interviews, the experiential logic of inheritors in judging kiln temperature and preparing glazes can be further captured, enabling systematic and complete digital preservation of tacit knowledge. [5-6]

Local projects in Jingdezhen have provided practical references for this. For example, the "Cultural Context China" ICH Digital Living Inheritance Project was launched locally. Relying on an all-media matrix and digital technology, it establishes an ICH database, collects and stores ICH information through interviews with inheritors, experts, and scholars, and carries out new media live broadcasting operations and immersive exhibitions, constructing a multi-dimensional digital archive system for ICH inheritance. The implementation of this project not only enriches ICH information resources but also provides important data support for subsequent digital communication and activation practices.

In terms of resource classification and management, the practical achievements of projects such as "Digital Porcelain Capital" and "Ancient Ceramic Gene Bank" can be referenced. Recently, relying on time-domain optical twin technology and big data technology, Jingdezhen has successfully constructed digital assets for more than 10,000 ceramic artifacts, and institutionalized the management of core characteristic data such as patterns, bodies, and glazes through the "Ancient Ceramic Gene Bank". In addition, the "One Ceramic Piece, One Blockchain" system built through blockchain technology has established "digital craftsman registries" for hundreds of inheritors and provided traceability certification for more than 100,000 high-end artistic ceramic products, realizing the dual recording and protection of process data and cultural identity.

The two-dimensional digital resource library of "craftsmanship + culture" constructed on this basis should include "three major sub-libraries": the core craftsmanship library records standardized process flows and operating

parameters; the artifact resource library covers digital models and cultural annotations of ancient ceramics and modern excellent works; the craftsman knowledge library integrates interview records, experience insights, and oral historical materials. The intelligent management platform built through AI and big data technology can realize intelligent resource retrieval, dynamic updates, and differentiated access, providing precise services for different roles. [7]

4.2. Building a Transmedia Digital Storytelling System in Digital Communication

To address the problems of insufficient coverage of traditional communication channels for Jingdezhen ceramic craftsmanship and limited reach to cross-regional and youth groups, digital communication paths can improve communication efficiency and cultural influence at multiple levels and through multiple channels. Based on the theory of transmedia storytelling, a digital communication system centered on immersive experience, interactive communication, and content innovation can be constructed.

Virtual Reality/Augmented Reality (VR/AR) technology is the core support for realizing immersive communication. By constructing virtual ceramic workshops, it can accurately reproduce the full-process scenes of traditional porcelain-making, allowing users to personally experience the operational details of key processes such as clay kneading, glazing, and kiln firing through immersive interaction; implanting AR navigation systems in offline scenarios such as museums and ancient kiln sites can realize the superposition of digital information and physical scenes. Tourists can obtain in-depth content such as craft displays and historical explanations in real-time through mobile terminals, significantly enhancing the richness and interest of the experience.

In response to the information reception habits of young audiences, a series of content such as "craftsmanship micro-courses", "craftsman stories", and "ICH interesting facts" can be developed based on mainstream media such as short videos and live broadcasts. Complex crafts are explained through vivid and accessible expressions, promoting the younger and more interesting presentation of traditional cultural content. The innovative practice of "ceramics + internet" carried out in Jingdezhen has achieved remarkable results. Online products such as digital museums, cloud exhibitions, and 3D cultural scrolls have received tens of millions of annual visits. By integrating topic specials through social platforms, the social influence of craftsmanship communication has been further expanded.

To promote cross-regional communication, multilingual digital content can be produced and released on mainstream overseas platforms to enhance international communication power. At the same time, promote the in-depth integration of digital craftsmanship content with educational scenarios, develop digital textbooks and interactive courseware suitable for primary and secondary schools as well as colleges and universities, and realize the interconnection of ceramic craftsmanship with disciplines such as history, science and technology, and fine arts.

4.3. Digital Empowerment of Inheritance Models and Industrial Development

Digital technology is not only used for recording and communication but can also be embedded in the craftsmanship inheritance model and industrial system, thereby realizing the living innovation of craftsmanship and the coordinated development of the industry. In terms of inheritance model innovation, a "digital master-apprentice system" platform can be developed, combining the online tacit knowledge database with offline practical guidance, enabling the interaction between masters and apprentices to break through geographical and time constraints, and providing personalized teaching and evaluation mechanisms through the platform. At the level of product innovation, the integrated practice of digital technology and traditional craftsmanship has gradually deepened. Some workshops combine 3D printing with manual decoration, quickly producing prototypes of complex vessel shapes before manually glazing and painting them, which not only reduces trial-and-error costs but also retains the warmth of handcraftsmanship; in addition, the "Millennium Ceramic Language" digital collectibles launched by Jingdezhen Cultural Tourism Group create virtual ceramic accessories based on ancient ceramic patterns, selling 10,000 copies within 3 days of launch, expanding the digital application scenarios of traditional craftsmanship.

In terms of industrial empowerment, a digital ecology for the ceramic industry can be constructed, integrating links such as design, production, sales, and logistics. Through big data analysis of market demand, it provides data support for enterprise decision-making and product R&D. The use of blockchain technology to realize product traceability and right confirmation can not only enhance brand value but also protect the rights of inheritors. By promoting the in-depth integration of the industry with culture and tourism as well as the digital economy, new digital projects such as metaverse ceramic cultural scenes can be developed to expand industrial development space. [8]

5. Summary

This study reveals the complexity of the contemporary inheritance of Jingdezhen ceramic craftsmanship and the possibility of empowerment by digital and intelligent technologies. By constructing a three-dimensional path of "digital protection—transmedia communication—industrial empowerment", it confirms that ICH activation needs to break through the thinking of static preservation and establish a dynamic inheritance mechanism adapted to the needs of the times. It must be pointed out that any digital inheritance strategy should be based on respecting the inherent value of craftsmanship and the living attributes of ICH. Technological intervention and market development need to set clear ethical boundaries to avoid the alienation of cultural connotations and the dilution of values. The current research exploration has the limitation of insufficient investigation into the differences between regional kiln systems. In the future, cross-kiln system comparative research can be further carried out to extract the common laws and differentiated paths of ICH digital inheritance. With the implementation of policies such as the "Regulations of Jingdezhen City on the Protection of Porcelain Industry Cultural Heritage", the protection of Jingdezhen ceramic craftsmanship will enter a new stage of standardized development. It is necessary to continuously explore the balance between technological empowerment and cultural authenticity, as well as the convergence point between inheritance needs and the development of the times in practice, so as to truly realize the ICH protection vision of "seeing people, objects, and life", and let the millennium-old porcelain-making craftsmanship continue its cultural context

and radiate lasting vitality in the digital age.

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