

Research on the visualization presentation and digital dissemination pathways of Chinese intangible cultural heritage

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Abstract. This paper systematically analyzes the diverse presentation methods of Intangible Cultural Heritage (ICH) in terms of visual representation and the key operational mechanisms of digital dissemination. It explores the integration logic underlying their convergence and examines the inherent contradictions within this integration process, such as the tension between visual representation and authenticity, the disjunction between digital technology and cultural context, and dilemmas including data ownership disputes. Finally, corresponding countermeasures and recommendations are proposed from institutional, stakeholder, and technological perspectives.

Keywords: intangible cultural heritage, visualization, digitization

1. Introduction

Digital technology has deeply penetrated into various fields of intangible cultural heritage protection and communication. In 2022, the *Opinions on Promoting the Implementation of the National Cultural Digitization Strategy* issued by the General Offices of the CPC Central Committee and The State Council clearly proposed that intangible cultural heritage should be included in the national cultural big data system, marking that the digitization of intangible cultural heritage has been upgraded from a departmental behavior to a national strategy. This policy shift not only reflects the great importance that the state attaches to the protection of traditional culture, but also reveals the paradigm change of cultural inheritance in the digital era — from the physical preservation of physical space to the multi-dimensional presentation of data space, from one-way knowledge transmission to interactive meaning co-construction.

However, there are two core problems in the current digital practice of intangible cultural heritage: first, the visual presentation mostly stays in the form of transformation, and lacks the in-depth exploration of cultural connotation. A large number of intangible cultural heritage digitization projects are keen on high-definition image recording and three-dimensional model construction, but ignore the situational and process characteristics of non-heritage as "living culture", resulting in digital achievements becoming "cultural specimens" rather than "living bodies". Second, digital communication is faced with the dilemma of content homogeneity, lack of audience participation, and imbalance of regional development. Intangible cultural

heritage digitization projects in the eastern coastal areas often get sufficient technical and financial support, while similar projects in the central and western regions are often difficult to sustain due to the lack of resources, forming a new "digital divide".

How to realize the effective integration of visual presentation and digital communication to make intangible cultural heritage both "visible" and "spread" has become an urgent theoretical and practical proposition to be cracked. The answer to this proposition needs to go beyond the single perspective of technological determinism and re-examine the essential goal of intangible cultural heritage digitization from the multi-disciplinary perspective of cultural ecology, media archaeology, sociology of knowledge and so on — not freezing traditional culture into digital archives, but realizing its contemporary transformation and living inheritance through technology enabling.

2. Multidimensional pathways of ICH visualization presentation

The essence of visual presentation is to transform the cultural genes contained in intangible cultural heritage into a visual symbol system that can be perceived. This transformation is not just "translation" or "transcoding", but also related to the reproduction of cultural meanings and the recoding of visual grammar. From an epistemological perspective, visual presentation wants to solve the long-standing "tacit knowledge" problem in non-genetic inheritance: how to obtain, transfer, and learn technical know-how, body experiences, and aesthetic intuitions that are difficult to describe in words through visual media. This transformation process mainly adopts three methods: extracting visual elements, organizing knowledge elements, and expanding media forms.

2.1. Extraction and transformation of visual elements

Visual element extraction and transformation is the basis of visual presentation. The patterns of Shu brocade have been continuously changing in history, and the colors are based on the "five-element colors" philosophy, and the structures have plain weave, twill weave, and satin weave [1]. For the dyeing and finishing process of tussah silk gauze, through data collection and physical performance analysis of 27 processes, the traditional composite process of "three steams, nine boils, and eighteen suns" is transformed into a visual data map, realizing the leap from "implicit knowledge" to "explicit image" [2].

2.2. Visualized organization of knowledge elements

The ICH semantic association network is built by visualizing knowledge elements. ICH resources can be decomposed into 9 types of knowledge elements (charts, documents, time, space, physical objects) according to theory, and become a structured system through semantic association [3]. Using Knowledge Graph (KG) technology to transform scattered ICH information into an interactive visual network. Taking Xuzhou paper-cutting as an example, the BERTopic model extracts 4 entity types (cultural elements, related charts, works/achievements, events/activities) and 5 relationships (inheritance/subordination), and constructs a knowledge graph containing more than 4,000 entities and more than 6,000 relationship pairs [4].

2.3. Diversification of media forms

Visual carriers are in various forms, and their development expands from static to dynamic/interactive. When static, hand-drawn maps present the geographical distribution of intangible cultural heritage; under dynamic conditions, digital animations, virtual reality/augmented reality create immersive experience scenarios [5]; in the interactive, virtual characters, online dojos change the audience from "viewers" to "participants" [6].

3. Key mechanisms of ICH digital dissemination

3.1. Influence mechanism of communication subjects

In the field of communication, the influence of communicators is a key factor affecting communication effects. Studies have shown that in the digital communication of intangible cultural heritage, the credibility of the information sender has an obvious positive impact on the audience's cognition, attitude and behavior, while the influence of official identity is not obvious [7]. This shows a trend of "decentralization of communication subjects" in the spread of intangible cultural heritage, that is, the public believes more in communicators with high credibility and clear communication intention, not simply relying on official backgrounds. In the specific context of the Guangdong-Hong Kong-Macao Greater Bay Area, intangible cultural heritage inheritors, local communicators, educational institutions and business entities jointly construct a multi-dimensional communication subject system to form a communication synergy [8].

3.2. Differential effects of communication content

The dimensions of the content to be spread are different. In a specific spread, the quality of the content has an obvious impact on the audience's cognition, and the type of content has an obvious impact on the audience's attitude and behavioral intention [7]. The research on the preferences of different audience groups shows that the audience interested in folk literature values the scale of the quantity of the content; the audience who loves traditional handicrafts pays attention to the diversity of the content forms and the communication channels; the audience interested in opera art is the most strict about the quality of the content. In the era of digital communication, the organization and distribution of video materials also need to accurately understand the content forms [9].

3.3. Technical support of communication channels

The technological achievements of information dissemination channels will have an impact on the communication effect. The ease of use of the communication channel and the user experience have a positive impact on the recipients' cognition, viewpoints, and behaviors, but the impact of channel diversity is not obvious [7]. The existing research evidence is as follows: In the BBC analysis model, both PD Online and Chaozhou News Network have reached the peak of the effect. The result of the super-efficient DEA model is that the overall communication effect index of PD Online is 108.82, which is much higher than 13 of Chaozhou News Network.36 [10].

3.4. Participatory communication of audiences

From the perspective of the audience, their behavior pattern is that information reception has changed from passive to active. The actual needs of the public will affect the cognition of intangible cultural heritage dissemination, and daily behaviors will directly affect the specific actions in dissemination [7]. In the digital environment, it is more common for users to create content, such as making short videos, sharing on social platforms, and carrying out secondary creation, thus promoting the intangible cultural heritage dissemination from one-way to multi-party collaborative creation [6].

4. The integration logic of visualization presentation and digital dissemination

4.1. Inherent correlation of integration

Visualization and digital dissemination are the double supports for the living inheritance of intangible cultural heritage. Viz pres builds the content foundation for digital dissemination, and digital technology expands the communication path of visual presentation. These two aspects have a collaborative situation in "preservation, management, transmission, and evaluation". In the preservation stage, visual information extraction is coordinated with high-precision collection; in the management stage, the knowledge network diagram plays a role in confirming data owners; in the transmission stage, multi-content planning is integrated with intelligent distribution; in the evaluation stage, the visualization of communication data is combined with dynamic analysis [6].

4.2. Practical forms of integration

There are various forms of integrated practice. The traditional dyeing and finishing techniques of Guangcai rely on digital visualization to fully preserve the production process [2]; the Shui script custom constructs an organizational network of knowledge elements [3]; relevant projects use hand-drawn maps and online platforms to make the dual presentation of geographical information visualization and content data digitization. The internal mechanism of this dual presentation is the deep interweaving of cultural logic and technical logic - technology has become an internal support for the living inheritance of intangible cultural heritage.

5. Practical dilemmas in integration practice

5.1. Conflict between visualization and authenticity

Image presentation and original reality are core matters in current practice. After intangible cultural heritage is visualized, it may be both "distorted" and lose its authenticity. This "distortion" can be reflected in the technical aspect (resource loss, color deviation, detail simplification), the performance aspect (perspective, editing, narrative change), and the deeper meaning aspect (context deviation, symbolic constraint fracture). For Shu brocade, existing research shows that if digital design does not match traditional weaving norms, it is difficult to apply the design to actual weaving [1]. When the physical craftsmanship is digitized, there are more hidden "distortions". The essence of intangible cultural heritage items such as Tai Chi, Kunqu opera performance and Guqin performance is often reflected in the indescribably "body", "charm" and "spirit". When these dynamic processes are transformed into video images, the irreversibility of time is eliminated, and the audience can pause, play back and fast forward at will. Although this way of viewing is convenient, it destroys the integrity and ritual sense of art appreciation. In addition, the subjective intervention of camera language — the cutting of the overall atmosphere by close-up, the restructuring of the time rhythm by editing, and the coverage of the original sound environment by soundtrack — all virtually change the presentation form of intangible cultural heritage.

5.2. Separation of digitization from cultural context

Digital communication is also an important factor in cultural context stripping. The digital translation of traditional intangible cultural heritage projects is often disconnected from the festival environment and community interaction, and the original cultural context is easily lost during communication, making it

difficult for people to generate a deep sense of cultural belonging. The problem of "de-contextualization" is particularly prominent in folk intangible cultural heritage. This context stripping is also reflected in the relationship between the inheritor and the community. In the traditional inheritance mode, the intangible cultural heritage is embedded in a specific social network, and the identity, skill level and social prestige of the inheriting person are established through the interaction within the community. Although digital communication expands the popularity of inheritors, it may pull them out of the community context, making them become isolated "cultural performers" rather than organic "community members". When the inheritors frequently go out to participate in recording, live broadcasting and performances, their connection with the local community may be weakened, and the virtual identification of online fans is difficult to replace the real support from neighbors and villagers, resulting in the tearing of identity.

5.3. Data rights confirmation challenges

The problem of data validation cannot be ignored. Intangible cultural heritage materials involve inheritors, local communities, recording personnel and development institutions, etc. Due to unclear ownership rights and imperfect benefit distribution, the phenomenon of "tragedy of the anti-commons" occurs [11]. Contrary to the "tragedy of the Commons" (the exhaustion of public resources due to excessive use), the "tragedy of the anti-commons" refers to the difficulty of effective use of resources due to excessive division of property rights. When multiple parties have overlapping and exclusive rights over the same data resource, neither party can develop and utilize it alone, resulting in idle resources. Specifically, the data generated in the process of digitization of intangible cultural heritage may include the following rights subjects: inheritors enjoy spiritual rights and some economic rights over their technical knowledge and performance image; Local communities have rights to collective cultural symbols and traditional knowledge; The recording personnel (photographers, interviewers, technicians) shall enjoy the copyright of their creative labor; Development institutions (museums, research institutes, enterprises) enjoy property rights to the digital achievements formed by investment; As the representative of public interest, the government enjoys the right to supervise the data related to national cultural security. The boundary and hierarchy between these rights are fuzzy, which leads to frequent disputes in practice.

6. Countermeasures and recommendations

6.1. Institutional level

In terms of system construction, the government should promote the improvement of the ownership definition of intangible cultural heritage related data and the income distribution system, establish the principle of "respecting data sources, rewarding related contributions, promoting inheritance and communication to achieve income sharing", and build the rights and interests division structure with source party priority [1]. Build an intangible cultural heritage data rights and interests registration system, clarify the rights share of all parties, learn from the experience of intellectual property registration, and cultivate the data trading market. The principle of "respecting sources, rewarding contributions and sharing benefits" should be established to ensure that inheritors have priority in obtaining commercial utilization benefits. Formulate technical standards and ethical norms for the whole chain, establish a community consultation and informed consent mechanism, and prohibit distorted and derogatory use.

6.2. Stakeholder level

At the subject level, the government should promote multiple subjects to jointly promote communication affairs, build a communication pattern in which the government takes the lead, inheritors play a core role and all sectors of society actively participate [8], and promote the steady progress of new communication modes of intangible cultural heritage. Strengthen the dominant position of inheritors, improve their independent communication ability through digital skills training, equipment funding and platform support, and respect their right to interpret skills. We will foster professional communication institutions, support the digital transformation of museums and cultural centers, encourage the participation of new media enterprises, establish a qualification certification and quality assessment system, and eliminate producers of vulgar content.

6.3. Technological level

At the technical level, the government should actively guide science and technology enterprises, deepen the practical application of digital technology, realize accurate access to information by relying on knowledge graph [4], create immersive experience by using VR/AR technology [5], and optimize communication strategies by relying on big data. Explore the mode of "offline experience center + online content distribution", and set up intangible cultural heritage VR experience points in community cultural centers, libraries and schools. Build a data-driven communication optimization mechanism, establish a monitoring and evaluation system, use big data to identify hot spots, predict trends, evaluate effects, dynamically adjust content production and channel delivery strategies, and strengthen data security and privacy protection to achieve a balance between communication efficiency and rights and interests protection.

7. Conclusion

This article systematically explores the visual and digital aspects of the protection of Intangible Cultural Heritage (ICH). It is found that effective visualization protection is relatively complex, involving element extraction, etc., and the communication effect is affected by the credibility of the subject, the quality of the content, the availability of channels, and the audience participation. The core argument is to deeply integrate these two dimensions for display, management, communication, and evaluation. At the same time, there are tensions, such as the contradiction between visual presentation and cultural authority, the risk of decontextualization, and the legal challenges of data rights. To overcome the "digital divide" and make intangible cultural heritage vibrant, it is necessary to go beyond technological determinism and shift to culturally sustainable methods, combining technological innovation with strong institutional guarantees, clear stakeholder rights, and communication-centric strategies, so that intangible cultural heritage can become "live inheritance" in the digital age.

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