

# Analysis and Path Reconstruction of the "Pseudo-Immersion" Phenomenon in Newly Built Museums

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## Abstract

In the digital intelligence era, digital exhibition displays have become a standard feature in newly established museums. However, some venues fall into the trap of "overemphasizing hardware while neglecting content transformation," resulting in pseudo-immersive experiences that limit heritage communication effectiveness. This paper aims to analyze the root causes of this phenomenon and explore solutions. Using the new Shaoxing Museum as a case study, we developed a dual-dimensional evaluation model encompassing Digitalization Maturity Index (DMI) and Cultural Communication Effectiveness Index (CDI). Through field surveys and audience feedback, we quantitatively assessed digital resource acquisition, interaction mechanisms, and content transformation. The results reveal a significant "supply-demand mismatch" in new venues: substantial hardware investments are made, yet shortcomings persist in tacit knowledge visualization, immersive interactions, and asset sharing. This creates a "high-tech infrastructure but low experiential quality" scenario, failing to achieve the transformation into "living cultural resources". Propose leveraging AIGC to empower cultural translation, deepen the "Museum+" cross-sector collaboration mechanism, and promote the transformation of digital exhibitions into in-depth knowledge interaction, thereby providing a new paradigm for local cultural heritage preservation.

**Keywords:** Pseudo-immersion, DMI, CDI, Cultural Translation;

# 1 Introduction

Digitalization has become the core driving force for transforming cultural relics into "living resources." However, currently, newly built local museums generally fall into the contradiction of "form over content" during their construction. Despite massive hardware investments, exhibitions often remain at the "pseudo-immersion" level of one-way video looping, lacking "cultural interpretation" and deep interaction, which results in low dissemination effectiveness [1]. Existing studies mostly focus on benchmark large museums or single technology applications, and rarely construct quantifiable performance evaluation models for newly built local venues, failing to reveal the supply-demand mismatch between the "digital foundation (supply side)" and "public cognition (demand side)." In view of this, taking the newly built Shaoxing Museum as a case study, this paper innovatively constructs a dual-dimensional evaluation system comprising the "Digital Maturity Index (DMI)" and the "Cultural Dissemination Index (CDI)." Through field investigation, it analyzes the crux of "pseudo-immersion" and proposes revitalization paths combining "AIGC empowerment" and the "Museum+" cross-boundary mechanism, providing an empirical reference for the sustainable transmission of local cultural heritage.

## 2 Literature review

In recent years, with the deep integration of cultural tourism and digital intelligence technology, the digital transformation of museums has become a hot topic in academia. Existing research on the digital protection and communication efficacy of cultural heritage primarily focuses on three dimensions. First, regarding digital protection technology and exhibition reflection. Studies point out that although 3D scanning and VR can break two-dimensional limits to achieve comprehensive information recording [2], current digital methods in some venues remain singular, lacking digital-backed decision-making support and systematic standards. However, in building 'cloud exhibitions', some museums have fallen into a 'pseudo-immersion' predicament that 'values hardware over experience'. This manifests in superficial online exhibitions that rely heavily on simple porting and image stacking, leading to a lack of deep audience engagement—meaning venues easily fall into a 'pseudo-immersion' lacking deep interaction. Especially in digital exhibition practices, the superficial phenomenon of 'online image stacking and offline one-way output' is common, meaning high tech investments fail to translate into profound cultural experiences [3]. Meanwhile, empirical studies confirm the immense advantages of 3D reconstruction and AI in immersive exhibitions. Yet, as grassroots venue construction accelerates, academia is wary of the 'piling up hardware, neglecting content' trend, where venues easily fall into the 'pseudo-immersion' trap. Second, regarding cultural translation and active communication efficacy. Academia agrees on shifting digital assets from 'static storage' to 'active inheritance'. Furthermore, deepening the 'cultural translation' concept shows that leveraging cutting-edge tech like AIGC not only achieves high-fidelity artifact restoration [4], but also transcends time, space, and cognitive limits, turning 'static heritage' into 'active cultural resources'. Finally, regarding cross-boundary empowerment and service extension. Scholars have explored 'Museum+' co-construction models, advocating breaking industry barriers to extend public services. Additionally,

literature deeply analyzes empowering educational work via AI and developing cultural products using new media matrices [5]. In summary, existing literature is fruitful, but mostly focuses on national benchmark museums. Few studies target the 'pseudo-immersion' phenomenon in newly built local museums [6] to construct a dual-dimension quantitative evaluation model covering 'Digital Maturity (DMI)' and 'Communication Efficacy (CDI)'. Therefore, quantitatively exploring the 'supply-demand mismatch' between digital foundation construction and public cultural translation in local venues holds significant theoretical increment and practical guiding value.

### 3 Research technique

The revitalization and utilization of cultural heritage require not only 'static' digital archiving but also 'dynamic' social dissemination [7]. Therefore, this study constructs the DMI-CDI dual-dimensional evaluation model. Specifically, DMI (Digital Maturity Index) primarily evaluates a venue's development level in areas such as data collection and interactive exhibition; meanwhile, CDI (Cultural Dissemination Index) focuses on assessing the conversion effectiveness of digital assets in aspects like cultural interpretation and public participation. Based on this logic, this paper primarily draws upon Mao Jie's research framework for constructing evaluation indicators of cultural governance efficacy in museum digital communication [8]. This paper establishes specific quantitative indicators for the evaluation system (Table 1). Within the DMI dimension, the assessment focuses on the adoption of technologies such as 3D laser scanning. Within the CDI dimension, the emphasis is placed on whether the dissemination of tacit knowledge has been achieved and whether internet-based cultural and creative products with local characteristics have been developed.

**Table 1.** Establishing a Two-Dimensional Performance Evaluation Index System for Local

| First dimension | Secondary indicator                        | Observation points and core assessment content  | Example of the scoring criteria (1-5-point scale)  |
|-----------------|--|---|--|
| DMI             | D1. Data Collection Accuracy               | Get artifact data.  | 1: Low-resolution image<br>3: Display high-definition images with local details<br>5: High-precision 3D Modeling and Texture Mapping                 |
|                 | D2. Resource Organization and Associations | Create a digital database.  | 1: Data is fragmented and not archived<br>3: Has an internal query system<br>5: Building multidimensional retrieval and knowledge map                |
|                 | D3. Display and Interaction Technology     | Should we adopt technologies like VR and AR to break the 'pseudo-immersion' of one-way video loops?     | 1: Only static display boards or one-way projection<br>3: Touch interactive large screen<br>5: Realizing Multi-sensory Immersive Virtual Interaction |
|                 | D4. Open and sharing mechanism             | Provide public authorization for digital assets, high-definition materials, or academic data downloads. | 1: Data is closed or unavailable<br>3: View basic images online<br>5: Perfect data opening and authorization mechanism                               |
| CDI             | C1. Dissemination visibility               | Whether to build a multi-dimensional new media matrix and increase exposure on the platform.            | 1: No official media account<br>3: Has a basic platform and updates regularly<br>5: Full network coverage and high-traffic content generation        |

| First dimension | Secondary indicator               | Observation points and core assessment content  | Example of the scoring criteria (1-5-point scale)   |
|-----------------|-----------------------------------|---|---|
| CDI             | C2. Cultural understanding        | The paper also discusses the visualization interpretation of tacit knowledge and cultural translation.  | 1: purely academic jargon<br>3: Basic text and image narration<br>5: Realizing Deep Translation by Digital Multimedia   |
|                 | C3. Public participation          | We have developed immersive experiences such as online interactions, offline real-scene puzzles, and digital study workshops.                     | 1: One-way visit only, no interaction<br>3: A basic comment or like feature is available<br>5: Foster high-frequency online-offline co-creation and interaction |
|                 | C4. Transformation and Derivation | With digital assets as the foundation, have distinctive and aesthetically appealing digital cultural and creative products and IPs been developed | 1: No derivatives or severe homogenization<br>3: Basic Textured Souvenirs<br>5: Successfully incubating digital cultural and creative IP                        |

To ensure the objectivity, authenticity, and multidimensionality of the evaluation results, this study combines qualitative observation with quantitative scales, primarily employing the following two data collection methods: First, fieldwork and participant observation. An in-depth field investigation was conducted at the newly built Shaoxing Museum in January 2026. During the investigation, assuming the dual roles of a tourist and an evaluator, the researcher focused on observing the actual operating conditions of the digital exhibition facilities and the on-site audience experience concerning core exhibits such as the 'Weiwei Buddha Statue' (Fig.1) and the 'Southern Song Porcelain Figurines' (Fig.2). Simultaneously, strictly adhering to the previously constructed dual-dimensional performance evaluation index system (Table 1), the researcher completed on-site scale scoring and photographic evidence collection, utilizing these as the primary, firsthand data for evaluating the Digital Maturity Index (DMI).



**Fig.1.** Wei wei Zun fo Stone Statue



**Fig.2.** Southern Song Dynasty Porcelain

Second, online text analysis. To objectively evaluate the venue's dissemination effectiveness (CDI) in the public sphere, the research team moved beyond a singular official perspective and adopted a multi-source data cross-validation approach. Specifically, the team not only investigated the provision of digital resources on the museum's official website and WeChat official account, but also systematically extracted public check-in records, bullet screen comments, and review texts regarding the museum's exhibitions from mainstream new media platforms such as Bilibili, Xiaohongshu. These textual data, embedded with the audience's authentic emotions and cognitive responses, provided a robust objective foundation for accurately evaluating the 'dissemination visibility' and 'public participation' of the digital assets.

## 4 Museum Review

In the empirical evaluation of the Digital Maturity Index (DMI) dimension, the Shaoxing Museum's new building exposes a significant phenomenon of 'valuing hardware stacking over deep interaction'. Field investigations show that its data collection (D1) remains at 2D planar photography, a traditional visual recording that fails to introduce deep digital collection modules like 3D laser scanning. Consequently, researchers and visitors can only obtain surface-level information, unable to conduct multi-dimensional digital anatomy and secondary development on complex artifacts like the 'Sanxingdui' relics. Lacking high-precision 3D data support, the museum scores only 1 point on the D1 indicator. Regarding backend resource organization and correlation (D2), despite acquiring some basic data, the museum's digital asset management has fallen into the quagmire of lacking unified archiving. Without established knowledge graphs, the data of various collections are isolated like 'information silos', resulting in a score of just 1 point for D2."

"For display and interaction (D3), although a 'digital exhibition hall' was created, its core exhibition method is merely one-way video looping via electronic screens. Failing to introduce deep interaction modules like Augmented Reality (AR) or Virtual Reality (VR), visitors can only engage in passive 'one-way viewing'. They cannot achieve immersive experiences like those at the Fahai Temple Mural Art Museum (Fig.3), nor explore the structural details of artifacts like the 'Musical Performance Copper House' in 3D.

Matching the baseline standard of 'only static display boards/one-way projection', D3 scores 1 point. Finally, regarding the online open and sharing mechanism (D4), the museum's official platform shows its digital assets remain in a closed state. The public and researchers cannot find portals to download publicly authorized or academic-grade data. This inaccessible closed-loop model severely restricts the socialized utilization of digital artifacts, yielding 1 point for D4. This further corroborates that some newly built venues have not yet established a truly immersive digital foundation.



**Fig.3.** Fahai Temple Mural Art Museum

In the evaluation of the Communication Efficacy (CDI) dimension, the new building of the Shaoxing Museum exhibits a distinct disconnect characterized by "high visibility but low conversion." Taking the highly popular "Southern Song Porcelain Figurines" as an example, network text analysis reveals that these artifacts, with their vivid and exaggerated forms, have achieved extremely high exposure on social media. They have become a "viral check-in spot" spontaneously shared by tourists, proving a solid foundation in C1 "Communication Visibility," thus scoring 3 points. However, the vast majority of this dissemination remains at the level of "shallow visual consumption."

The museum also exposes a bottleneck of "insufficient translation depth" regarding C2 "Cultural Understanding." Field research found that when explaining the complex firing process of Yue kiln celadon, although the museum avoided the rigid piling up of purely academic terms, its interpretation methods remained limited to superficial static structural breakdown diagrams and basic plain-language explanations. While this traditional method conveys basic knowledge, it fails to utilize digital multimedia technology to transform it into intuitive 3D educational animations or holographic demonstrations, causing the excavation of "tacit knowledge" to stop at a superficial level. Matching the intermediate characteristic of "possessing basic graphic and plain-text explanations," the C2 indicator is assessed at 3 points.

Regarding C3 "Public Participation," compared to the AR glasses smart guide at the Nanjing Museum and the "generate your exclusive terracotta warrior" online interactive design at the Emperor Qinshihuang's Mausoleum Site Museum, the new Shaoxing Museum has failed to develop any online engaging programs. Consequently, the visitors' experience remains entirely at the one-way reception stage of "taking a cursory glance and leaving after taking

photos," failing to form effective knowledge interaction, scoring only 1 point. Furthermore, for the C4 "Conversion and Derivation" indicator, the museum failed to capture the massive IP potential behind the "emoji porcelain figurines." Compared to the Henan Museum's successful transformation of the "Night Banquet in Tang Dynasty Palace" (Fig.4) into hit blind boxes [9], the Shaoxing Museum has not digitally extracted these internet-friendly resources to develop official animated emojis, interactive mini-programs, or digital creative products. This lack of capability reduces local cultural symbols to static background props [10], failing to convert "traffic" into "cultural increment" and "economic benefit", leaving its C4 score at just 1 point. DMI and CDI Dimension Evaluation of Shaoxing Museum (Table 2).



**Fig.4.** VR Scene of Tang Palace Night Banquet

**Table 2.** Evaluation of DMI and CDI Dimensions for Shaoxing Museum

| Index Category | Indicator Code & Name                      | Score (1-5 Scale) |
|----------------|--|-------------------|
| DMI            | D1. Data Collection Accuracy               | 1                 |
|                | D2. Resource Organization and Associations | 1                 |
|                | D3. Display and Interaction Technology     | 1                 |
|                | D4. Open and sharing mechanism             | 1                 |
| CDI            | C1. Dissemination visibility               | 3                 |
|                | C2. Cultural understanding                 | 3                 |
|                | C3. Public participation                   | 1                 |
|                | C4. Transformation and Derivation          | 1                 |

## 5 Museum Pseudo-Immersion and Cause Analysis

Based on the aforementioned results of the DMI-CDI dual-dimensional performance evaluation, the digital construction of the newly built Shaoxing Museum reveals a striking contradiction characterized by 'high hardware, low experience.' Investigating the underlying causes, this phenomenon primarily stems from structural constraints across the following three dimensions:

**Conceptual Deviation: The Outdated Mindset of "Emphasizing Hardware Construction over Content Interpretation"** Currently, during the initial planning stages, some newly built local venues often fall into the misconception of the "hardware-only fallacy." In terms of budget allocation, massive funds are poured into the creation of grand venue spaces and the procurement of

expensive basic display equipment (such as large screens and projectors), while continuous investment and research and development in the digital content ecosystem (such as high-precision 3D modeling, immersive interactive programs, and the visual interpretation of tacit knowledge) are severely neglected. This conceptual deviation of "emphasizing hardware over content" directly leads to digital exhibition halls being reduced to "two-dimensional video playback rooms" lacking deep interaction, making it difficult for high-value cultural heritage to cross the chasm from "static display" to "dynamic dissemination."

**Talent Barrier: The Extreme Shortage of Composite "Digital-Intelligent" Museum Professionals.** The digitalization of museums is an interdisciplinary systematic project. As pointed out in existing research, the current training systems for museology majors in most universities lean heavily toward traditional archaeology and restoration, with minimal exposure to modern information technology. When facing the demands of cross-boundary integration between technology and commerce, traditional museum professionals often exhibit shortcomings, highlighting an urgent need for composite talents with a cross-boundary vision [11]. In practice, local venues are often forced to simply outsource their digital operations to pure technology companies lacking profound cultural understanding. This fragmented state—where "those who understand museology do not understand technology, and those who understand technology do not understand culture"—causes exhibition content to remain superficial in form. It fails to accurately capture the contemporary internet appeal and IP potential of cultural relics such as the "Southern Song Porcelain Figurines," thereby severely limiting the depth of the relics' "cultural interpretation."

**Funding and Mechanism Bottlenecks: Insufficient Driving Force for the Derivation and Long-term Operation of Digital Assets.** The revitalization and utilization of digital assets require not only initial investment but also long-term incubation mechanisms. However, as non-profit public institutions, most local comprehensive museums have a singular channel for research and development funding, relying primarily on limited government financial allocations. Following massive infrastructure expenditures for new venues, there is often a lack of dedicated funds for subsequent digital exhibition updates and the research and development of high value-added cultural and creative products. The dual constraints of funding and mechanisms leave museums lacking the capability for rapid response and market conversion when faced with the massive traffic spontaneously generated on social media platforms, ultimately leading to the disconnect between high dissemination visibility and a low cultural consumption conversion rate.

## **6 Reconstruction of the Path of Digital Exhibition of New Local Museums**

In response to the structural dilemmas exposed in the evaluation, such as 'pseudo-immersion' and the disconnect of 'high visibility but low conversion rate,' newly built local comprehensive museums must break through the traditional mindset of a 'physical showroom.' Based on the DMI-CDI dual-dimensional evaluation model, this paper proposes the following three practical upgrade paths:

**AIGC Empowerment and Deep Interaction: Promoting the Transformation from "Hardware Accumulation" to "Cultural Interpretation"** To break the inefficient exhibition mode of "projectors or electronic screens looping videos," venues must

achieve a leap from "passive one-way viewing" to "deep knowledge interactive services." On the one hand, deep interaction technologies such as AR (Augmented Reality) and VR (Virtual Reality) should be reasonably introduced. For example, targeting core cultural relics like the "Bronze House with Musicians," multi-sensory immersive experience modules should be developed, allowing tourists to independently explore their internal structures and craftsmanship details. On the other hand, the advantages of AIGC technology should be fully utilized. As pointed out in existing research, using AIGC large models can create precise profiles for different audiences (e.g., children, scholars, and general tourists) to automatically generate audience-specific and personalized guide scripts and "cultural interpretation" content. This greatly lowers the cognitive threshold of tacit knowledge and enhances tourists' comprehension and participation [12].

"Museum"+ "Cross-boundary Co-construction: Reconstructing a "People-Oriented" Dynamic Cultural Field Facing the barriers of digital technology talent shortages and insufficient driving forces for long-term operation, local museums should actively construct an open and collaborative "Museum+" ecosystem. Venues must break down industry silos and proactively engage in "cross-boundary co-construction and sharing" with local technology enterprises, university research teams, and high-quality cultural and tourism institutions. For instance, the planning and interactive program development of certain digital exhibition halls can be transformed into industry-university-research collaborative projects with university digital media art departments. This not only effectively compensates for the internal shortage of "digital-intelligent" talents but also introduces the innovative thinking of the younger generation, thereby transforming static physical spaces into active public cultural service and innovation platforms.

Super IP Incubation and Digital Derivation: Closing the Conversion Loop of "Traffic Monetization" Targeting exhibits with immense potential for online dissemination, such as the "Southern Song Porcelain Figurines," museums must establish an astute mechanism for the derivative conversion of digital assets to address the pain point of the "low conversion rate (C4)." First, high-precision extraction of the digital models and texture data of such cultural relics should be conducted to develop lightweight interactive digital products, such as official dynamic emojis and AR puzzle-solving mini-programs, thereby enhancing public online engagement. Second, drawing on the successful experiences of benchmark venues, unique cultural symbols must be integrated with modern aesthetics to develop high value-added cultural and creative products featuring blind box mechanisms, digital collectibles, and other formats [13]. By closing the loop of "digital exhibition—social check-in—cultural and creative consumption," not only can the dynamic inheritance of excellent traditional Chinese culture be achieved, but it can also provide continuous financial feedback for the museum's subsequent digital construction.

## 7 Conclusion

In the era of digital intelligence, the digital transformation of museums has become an irreversible industry trend. However, how to avoid falling into the trap of "technology worship" and the "pseudo-immersion" characterized by "emphasizing hardware over content" is a pressing practical issue that newly built local comprehensive museums urgently need to address. Taking the newly built Shaoxing Museum and others as empirical cases, this paper innovatively constructs a dual-dimensional evaluation scale encompassing the "Digital Maturity Index (DMI)" and the "Cultural Dissemination Index (CDI)." The research confirms a significant "supply-demand mismatch" between digital foundation construction and public cultural cognition in some newly built venues; one-way digital imaging spaces have led to the structural contradiction of "high hardware, low experience."

Simultaneously, the lack of capability in the derivative conversion of digital assets causes highly visible internet traffic to fail in successfully consolidating into long-term cultural IP increments.

Consequently, this paper proposes that the digital practices of newly built local museums must return to the core essence of being "people-oriented" and focusing on "cultural interpretation." Only by introducing cutting-edge technologies such as AIGC to empower the visual interpretation of tacit knowledge, deepening the "Museum+" cross-boundary collaborative co-construction mechanism, and actively building a digital derivation closed loop of super IPs, can digital exhibitions achieve a comprehensive leap from "passive one-way viewing" to "deep knowledge interaction." This is not merely a reconstruction of the current digitalization paths of local museums, but also an active implementation of the revitalization and utilization policies for cultural heritage in the new era. It is expected that the evaluation model and practical paradigm constructed in this study will provide actionable theoretical support and empirical reference for the high-quality "digital-intelligent" development of similar venues domestically.

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