

Constructing a Digital Identity Map for Qiang Embroidery in China: A Cross-Regional Heritage Study

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KEYWORDS:

Qiang embroidery
Digital identity map
Intangible cultural heritage
Blockchain
Innovative transformation

CITATION:

Zheng, F., Muhamad Fairus, K., & Rusmawati, G. (2026). Constructing a Digital Identity Map for Qiang Embroidery in China: A Cross-Regional Heritage Study. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 11(2), e003792.
<https://doi.org/10.47405/mjssh.v11i2.3792>

ABSTRACT

This study addresses the lack of cross-regional research on Qiang embroidery and explores how digital technologies can support the structured representation of intangible cultural heritage. Focusing on Sichuan, Shaanxi, and Gansu, the study proposes a framework for constructing a digital identity map for Qiang embroidery. A qualitative-dominant mixed approach was employed, integrating literature analysis, fieldwork, multimodal digital analysis, and blockchain-based experimentation. The findings reveal a gradient evolution of Qiang embroidery from indigenous forms in Sichuan to transitional expressions in Gansu and hybrid forms in Shaanxi, reflecting cultural interaction and migration. The digital identity map enhances the organisation and interpretability of cultural information by integrating motifs, craftsmanship, regional attributes, and transmission lineages into structured identity units. Furthermore, blockchain and NFT applications strengthen cultural credibility, traceability, and dissemination, enabling more effective public engagement and cross-regional comparison. The study concludes that digital identity mapping provides a new pathway for balancing cultural authenticity and digital innovation, contributing to sustainable transmission and global communication of intangible cultural heritage.

Contribution/Originality: This study contributes to the literature by introducing the concept of a digital identity map for cross-regional intangible cultural heritage. By integrating cultural analysis with blockchain and NFT technologies, it provides a structured approach for representing cultural identity and offers a sustainable pathway for heritage digitalisation and global dissemination.

1. Introduction

With the release of the Opinions on Promoting the Implementation of the National Cultural Digitalisation Strategy, the construction of a national cultural database and a

digital safeguarding system for intangible cultural heritage has become a key national task. Intangible cultural heritage in ethnic regions has been identified as a priority area, emphasising the classification, identification, and systematic integration of cultural resources. However, existing digital studies on Qiang embroidery have predominantly focused on Sichuan Province, while regions such as Shaanxi and Gansu—characterised by historical migration and cultural integration—have received limited scholarly attention. As a result, cross-regional comparison and systematic modelling remain notably insufficient.

Meanwhile, the application of blockchain and NFT technologies in the field of cultural heritage has gradually expanded, offering new technical conditions for copyright authentication, traceability, and innovative dissemination. Nevertheless, most existing studies remain at the level of “digital collectibles” or visual display, lacking an integrated theoretical and methodological system centred on “digital identity.” Against this background, this study adopts a cross-regional cultural comparative perspective and introduces the concept of digital identity to reconstruct Qiang embroidery in a systematic and structured digital form.

1.1. Research Objectives

- i. To construct a cross-regional comparative framework for analysing Qiang embroidery across Sichuan, Gansu, and Shaanxi.
- ii. To conceptualise and structure the notion of digital identity in the context of intangible cultural heritage.
- iii. To examine the role of digital technologies, including blockchain and NFTs, in supporting cultural transmission.
- iv. To propose a digital identity mapping approach for sustainable heritage digitalisation.

2. Literature Review

2.1. Studies on Qiang Embroidery and Regional Cultural Representation

Existing studies on Qiang embroidery have primarily focused on the documentation of motifs, techniques, and symbolic meanings, with a strong geographical emphasis on Sichuan Province. Scholars have made valuable contributions by cataloguing visual patterns and analysing their aesthetic and cultural characteristics, particularly in relation to ritual practices and ethnic identity (Wang & Li, 2024). These studies have helped establish a foundational understanding of Qiang embroidery as a form of cultural expression.

However, a critical limitation of this body of literature lies in its regional concentration. Research on Qiang embroidery in Shaanxi and Gansu—regions historically shaped by migration, cultural contact, and ethnic intermixing—remains limited and fragmented. As a result, existing studies often present Qiang embroidery as a relatively homogeneous cultural form, overlooking its internal diversity and regional transformation. This lack of cross-regional comparison constrains broader interpretations of how Qiang embroidery adapts to different social and historical contexts.

From an anthropological perspective, ethnic crafts are not static artefacts but dynamic cultural practices shaped by social interaction and environmental change (Fei, 1999).

The absence of comparative regional analysis in current Qiang embroidery studies therefore represents a significant gap, particularly in understanding cultural hybridity and transformation across cultural contact zones.

2.2. Digitalisation of Intangible Cultural Heritage: Achievements and Limitations

With the advancement of digital technologies, a growing body of research has explored the digitalisation of intangible cultural heritage (ICH), focusing on documentation, archiving, and visual representation. In the context of Qiang embroidery, digital methods such as image scanning, database construction, and three-dimensional modelling have been employed to support preservation and dissemination efforts (Yang, Zhang, & Hu, 2022; Meng, 2021). These studies have significantly enhanced the accessibility of traditional embroidery resources and contributed to heritage safeguarding.

Nevertheless, existing digitalisation approaches tend to prioritise technical representation over cultural structure. Most projects treat digitalisation as a process of converting physical artefacts into digital formats, without sufficiently addressing how cultural meanings, transmission relationships, and contextual knowledge are organised within digital systems. As a result, digital archives often remain fragmented collections of images rather than integrated cultural knowledge systems.

International policy-oriented research has increasingly emphasised that digital technologies should not merely record heritage but support its sustainable and meaningful transmission (UNESCO, 2019). From this perspective, current studies on Qiang embroidery digitalisation fall short in conceptualising how digital systems can reflect cultural relationships, regional variation, and identity formation.

2.3. Blockchain, NFT, and Cultural Heritage: Emerging Debates

Recent scholarship has begun to explore the application of blockchain and NFT technologies in the cultural and creative sectors, particularly in relation to authenticity, ownership, and value distribution. Cultural economists and media scholars argue that blockchain technologies have the potential to reshape cultural production and circulation by enabling decentralised systems of verification and participation (Tapscott & Tapscott, 2018; Potts & Hartley, 2020).

In the field of cultural heritage, experimental practices—such as museum-based NFT projects and digital cultural products—have demonstrated new possibilities for engagement and economic sustainability. However, existing studies largely approach NFTs from a market or technological perspective, paying limited attention to their implications for cultural structure and identity representation. The question of how NFTs can meaningfully encode cultural context, rather than merely functioning as digital commodities, remains underexplored.

Moreover, few studies integrate blockchain technologies with ethnographic or regionally grounded heritage research. This disconnect highlights the need for interdisciplinary approaches that combine cultural analysis with digital infrastructure design.

2.4. Research Gaps and Positioning of the Present Study

Based on the above review, three key gaps can be identified in existing scholarship. First, research on Qiang embroidery lacks cross-regional comparative analysis, particularly regarding Shaanxi and Gansu as culturally transitional zones. Second, current digitalisation studies focus predominantly on representation rather than cultural structure, limiting their capacity to support identity-based heritage transmission. Third, emerging technologies such as blockchain and NFTs are rarely examined through the lens of cultural identity and regional variation.

To address these gaps, the present study introduces the concept of digital identity as an integrative framework for analysing and representing Qiang embroidery across regions. By combining ethnographic research, multi-modal digital analysis, and blockchain-based identity encoding, this study seeks to move beyond descriptive documentation and towards a structurally informed model of intangible cultural heritage digitalisation.

3. Research Methods

This study adopts a qualitative-dominant mixed-method design. A qualitative approach was selected as the primary framework to explore cultural meanings, regional variation, and transmission patterns of Qiang embroidery, while digital experimentation using blockchain and NFT technologies served as a supplementary component to validate the applicability of digital identity mapping (Wang & Hannafin, 2005). This design was chosen to integrate cultural analysis with technological exploration in a real-world heritage context (Creswell, 2013).

The research was conducted across three key Qiang cultural regions: Sichuan, Gansu, and Shaanxi Provinces in western China. These locations were selected due to their differing historical trajectories and degrees of cultural continuity. Sichuan represents a core cultural area with relatively intact traditional practices, Gansu reflects transitional cultural zones shaped by interethnic contact, and Shaanxi demonstrates hybrid cultural integration. This cross-regional selection enables comparative analysis of cultural evolution.

The study population consisted of embroidery practitioners, local cultural observers, and representative embroidery artefacts. For the qualitative component, participants included individuals familiar with embroidery practices and cultural transmission in the selected regions. The study analysed 23 representative embroidery samples and conducted semi-structured interviews with 12 participants across Sichuan, Gansu, and Shaanxi.

The sample size was determined based on qualitative research principles prioritising cultural depth and contextual richness rather than statistical generalisation. A purposive sampling strategy was adopted to ensure the inclusion of culturally significant samples and knowledgeable participants across regions. This approach is widely accepted in heritage and ethnographic research where contextual richness is essential.

Semi-structured interviews were employed as the primary data collection method (Bernard, 2017). Interviews were conducted mainly through face-to-face communication during fieldwork, supplemented by follow-up virtual communication when necessary. Conversations typically lasted between 40 and 90 minutes. With

participants' consent, data were documented through note-taking and selective audio recording, ensuring accurate capture of cultural narratives and contextual insights.

Qualitative data were analysed using thematic analysis to identify patterns related to motif structure, craftsmanship, and cultural semantics (Flick, 2018). Multimodal interpretation integrating visual and contextual analysis was applied to embroidery samples (Kress, 2010). The analytical process followed iterative coding and cross-regional comparison principles commonly used in qualitative cultural research. Digital experimentation involving blockchain and NFT mapping was used to support interpretive validation (Tapscott & Tapscott, 2018).

All research procedures followed standard ethical guidelines for social science research. Participation was voluntary, and informed consent was obtained from all participants prior to interviews. Personal identifiers were anonymised to protect privacy, and cultural materials were documented solely for academic purposes.

4. Results

This study presents the results of a systematic analysis of Qiang embroidery samples from Sichuan, Gansu, and Shaanxi Provinces. The findings demonstrate that Qiang embroidery exhibits significant regional variation in motif structure, craftsmanship, and cultural semantics, while simultaneously revealing a continuous historical trajectory shaped by migration, cultural interaction, and social adaptation. Rather than representing isolated or fragmented developments, these regional differences reflect the dynamic nature of ethnic craftsmanship as a cultural practice embedded within changing social environments.

4.1 Cross-Regional Differences and Gradient Evolution of Qiang Embroidery Motifs

The analysis indicates that Qiang embroidery in Sichuan Province retains relatively complete indigenous cultural characteristics (see Table 1). Motifs commonly derive from nature worship, ancestral beliefs, and totemic symbolism, reflecting strong ritual and spiritual functions. These motifs are frequently associated with specific festivals, ceremonial occasions, and expressions of ethnic identity. Structurally, Sichuan Qiang embroidery emphasises repetition, symmetry, and symbolic stability, suggesting that embroidery continues to function as a medium for transmitting collective memory and cosmological beliefs within traditional Qiang communities.

This finding corresponds with previous studies that identify Sichuan as a core area where Qiang embroidery has maintained a close connection to ritual practices and spiritual symbolism (Wang & Li, 2024). The persistence of these features can be attributed to the relatively concentrated settlement patterns of Qiang communities in Sichuan, where social structures and belief systems have remained comparatively stable over time. As a result, embroidery in this region continues to prioritise symbolic meaning over decorative variation.

In contrast, Qiang embroidery in Wen County, Gansu Province exhibits pronounced transitional characteristics. While certain traditional Qiang motifs are still present, notable changes can be observed in composition, colour usage, and decorative style. These changes reflect the gradual incorporation of aesthetic elements from neighbouring ethnic groups and regional folk traditions. The embroidery motifs in this

area often demonstrate greater flexibility and variation, indicating a shift from strictly ritual functions toward combined symbolic and decorative roles.

Table 1: Cross-Regional Characteristics of Qiang Embroidery in China

Region	Motif Characteristics	Cultural Functions	Social and Historical Context
Sichuan	Totemic and nature-inspired motifs; strong ritual symbolism and repetitive structures	Ritual practices; expression of ethnic identity and spiritual beliefs	Relatively concentrated Qiang communities; stable cultural transmission
Gansu	Transitional and hybrid motifs; re-semanticised symbols influenced by neighbouring cultures	Combined symbolic and decorative functions	Multi-ethnic contact zones shaped by migration and cultural interaction
Shaanxi	Everyday-life-oriented and decorative motifs; weakened ritual symbolism	Practical, aesthetic, and folk-art functions	Long-term coexistence and integration of Han and Qiang cultures

This transitional pattern reflects a process of re-semanticisation, in which original symbolic meanings are reinterpreted and reorganised within new social contexts. As Gansu lies within a cultural contact zone characterised by long-term interethnic interaction, Qiang embroidery in this region embodies hybrid visual languages rather than fixed symbolic systems. Such characteristics are consistent with ethnographic observations that handicrafts in cultural contact zones often display mixed symbols and adaptive meanings as artisans respond to changing social environments (Fei, 1999).

Qiang embroidery in Ningqiang County, Shaanxi Province demonstrates an even more pronounced pattern of cultural integration. Motifs in this region increasingly draw upon themes related to everyday life, local customs, and folk aesthetics, while traditional religious and totemic symbolism becomes comparatively weakened. Decorative and practical functions are significantly enhanced, indicating a transformation in the social role of embroidery from a primarily ritual medium to a form of regional folk art.

This shift corresponds with the long-standing coexistence of Han and Qiang populations in southern Shaanxi, where cultural boundaries have gradually blurred through sustained interaction. The embroidery practices observed in Ningqiang thus reflect a process of cultural fusion, in which Qiang artistic traditions have been reshaped within a broader socio-cultural framework. Rather than representing cultural loss, this transformation illustrates adaptive continuity, whereby embroidery evolves in response to local social needs while retaining traces of its cultural origins.

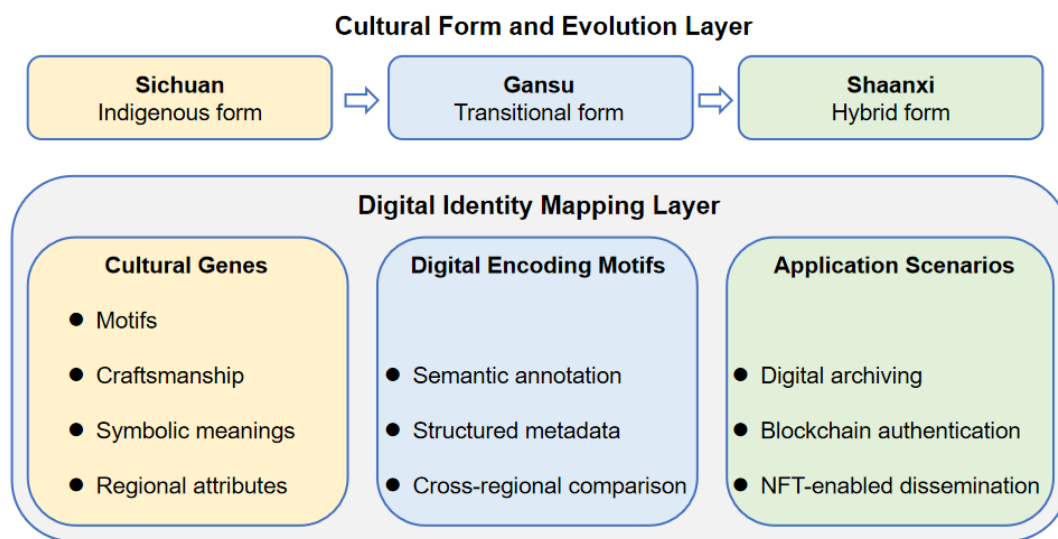
4.2. Cultural Transmission Mechanisms in Cross-Regional Comparison

Through horizontal comparison across Sichuan, Gansu, and Shaanxi, the study further reveals that variations in Qiang embroidery motifs cannot be understood as simple processes of preservation or disappearance. Instead, these variations are closely linked to regional social structures, degrees of ethnic interaction, and shifts in cultural function. In Sichuan, the stability and ritual orientation of embroidery correspond to relatively homogeneous community structures and sustained cultural continuity. In Gansu,

transitional forms reflect the negotiation of cultural meaning within multi-ethnic contact zones, where symbolic systems are continuously adjusted. In Shaanxi, the integrated forms of embroidery indicate long-term cultural coexistence, resulting in functional transformation and aesthetic diversification.

This gradient evolution—from indigenous to transitional and hybrid forms—supports the view that ethnic culture is not static but dynamically reconstructed through social interaction and historical movement (see Figure 1). From this perspective, Qiang embroidery should be understood not merely as a craft technique but as a cultural practice that continuously adjusts its expressive strategies in response to social change. Such findings reinforce anthropological theories that emphasise cultural adaptability and interaction rather than fixed cultural boundaries (Fei, 1999).

Figure 1: Gradient Evolution and Digital Identity Mapping of Qiang Embroidery



4.3. Effects of the Digital Identity Map on Cultural Information Integration

During the digital processing and analysis phase, the study found that integrating motifs, craftsmanship, regional attributes, and inheritor information into unified “digital identity units” significantly improved the organisation and interpretability of cultural information. Prior to digital identity mapping, information related to Qiang embroidery was fragmented across physical artefacts, oral narratives, and visual documentation, making systematic comparison and interpretation difficult.

Through cultural element decomposition and semantic annotation, implicit cultural knowledge embedded in embroidery practices was transformed into structured data nodes. These nodes were organised into a hierarchical digital identity map that clearly articulated relationships among regions, motifs, techniques, and transmission lineages. As a result, the digital identity map enabled more effective cross-regional comparison and cultural analysis.

This finding aligns with international discussions on the digital safeguarding of intangible cultural heritage, which emphasise a shift from simple documentation toward system-based cultural representation. Research has highlighted that the effectiveness of digitalisation depends not on the volume of information collected but on the clarity with which cultural structures and relationships are represented (UNESCO, 2019). In this

study, the application of a digital identity map demonstrates how such principles can be operationalised within a specific ICH case.

4.4. Impacts of Blockchain and NFT Applications on Dissemination and Cognition

The study further indicates that the introduction of blockchain technology for digital identity authentication offers clear advantages in terms of cultural credibility and information stability. The immutability and traceability of blockchain records ensure that digital representations of Qiang embroidery maintain consistent cultural attribution during dissemination and reuse. This reduces the risk of misinterpretation, unauthorised alteration, or contextual distortion of cultural information.

These findings are consistent with existing research on the role of blockchain in cultural heritage authentication and provenance tracking (Tapscott & Tapscott, 2018). By embedding digital identity information within blockchain systems, Qiang embroidery gains a reliable mechanism for long-term cultural verification.

Building upon this foundation, presenting Qiang embroidery through NFT-based formats further expands its dissemination potential. NFTs function as identifiable digital carriers that combine visual representation with structured cultural metadata. Cultural industry research suggests that such formats enhance visibility and audience engagement by providing clear contextual cues and interactive pathways (Potts & Hartley, 2020).

User feedback collected during the study supports this observation. Compared with conventional image-based displays, NFT-based presentations grounded in digital identity structures were found to facilitate clearer cultural understanding among non-specialist audiences. This suggests that digital identity-oriented presentation formats can play an important role in guiding cultural cognition and promoting meaningful engagement with intangible cultural heritage.

Overall, the expanded results demonstrate that Qiang embroidery across Sichuan, Gansu, and Shaanxi reflects a dynamic gradient of cultural transformation shaped by migration, interaction, and social adaptation. The construction of a digital identity map enhances the structural representation and interpretability of cultural information, while blockchain and NFT technologies contribute to credibility, dissemination, and public understanding. Together, these findings highlight the potential of integrating cultural analysis with digital technologies to support the sustainable transmission of intangible cultural heritage.

5. Conclusion

This study has examined Qiang embroidery from a cross-regional perspective, focusing on Sichuan, Gansu, and Shaanxi, and has explored how digital technologies can support the structured representation and sustainable transmission of intangible cultural heritage (ICH). By analysing variations in motifs, craftsmanship, and cultural semantics, the research demonstrates that Qiang embroidery is not a homogeneous cultural form but a dynamic craft tradition shaped by migration, cultural interaction, and social adaptation. The findings confirm that regional differences in Qiang embroidery reflect a gradient evolution from indigenous to transitional and hybrid expressions rather than processes of simple preservation or loss.

From a theoretical perspective, this study contributes to ongoing debates in ICH research by challenging static, archive-oriented approaches to digitalisation. Instead of treating digitalisation as the mere conversion of physical artefacts into digital records, the research conceptualises it as a process of digital identity construction. By integrating cultural origin, regional attributes, symbolic meanings, and transmission relationships into structured digital identity units, the study demonstrates how cultural identity can be meaningfully represented within digital environments. This approach aligns with international perspectives that emphasise the dynamic and process-oriented nature of intangible cultural heritage safeguarding (UNESCO, 2019).

The proposed framework also extends existing cultural sustainability discussions by highlighting the role of digital structures in supporting long-term cultural continuity. Cultural sustainability theory suggests that cultural value must be continuously reproduced through social participation and adaptive mechanisms rather than preserved in static form (Throsby, 2008). In this regard, the digital identity map developed in this study functions as a mediating structure that connects traditional cultural practices with contemporary digital systems, enabling Qiang embroidery to maintain relevance and recognisability in changing social contexts.

At the practical level, the findings provide insights for heritage practitioners, cultural institutions, and digital platform designers. The results suggest that structuring cultural information through digital identity maps can significantly enhance interpretability, comparability, and traceability, especially in cross-regional and cross-cultural contexts. Compared with conventional image-based digital archives, identity-oriented digital representations offer clearer contextual cues for non-specialist audiences, thereby improving cultural understanding and engagement. Furthermore, the integration of blockchain technology enhances the credibility and stability of digital heritage records, while NFT-based applications provide new channels for dissemination and participation without reducing cultural content to mere digital commodities.

Despite these contributions, this study has certain limitations. First, the empirical focus is limited to three regions in western China, and future research could extend the comparative framework to additional Qiang communities or other ethnic embroidery traditions to test the broader applicability of the digital identity approach. Second, while the study explores user feedback at an exploratory level, more systematic user studies and longitudinal evaluations are needed to assess the long-term social and educational impacts of digital identity-based heritage presentation. Finally, technological platforms and standards continue to evolve rapidly, and future research should further examine how emerging digital infrastructures may reshape cultural identity representation and governance.

In conclusion, this study argues that digital identity should be understood as a critical nexus linking cultural meaning, technological systems, and application scenarios in the digital transformation of intangible cultural heritage. By moving beyond archival preservation toward structured identity construction, the proposed approach offers a replicable pathway for balancing cultural authenticity, social participation, and sustainable transmission. These insights contribute to both theoretical discussions and practical strategies for intangible cultural heritage safeguarding in the era of cultural digitalisation.

Ethics Approval and Consent to Participate

All procedures involving human participants followed standard ethical guidelines for social science research, and informed consent was obtained from all participants.

Acknowledgement

Part of this article was extracted from a doctoral study conducted at Universiti Teknologi MARA (UiTM), Faculty of Art and Design, Shah Alam, Malaysia.

Funding

This study research was supported by the Youth Innovation Team of Shaanxi Universities (2025).

Conflict of Interest

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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