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From Cultural Genes to Cultural Management An Exploration of the Inheritance Path of Traditional Vernacular Dwellings in the Jianghan Plain

Yin Yi *, Tian Zhaolin, Chu Fuwei
School of Arts, Jingchu University of Technology, Huibei, China
***Corresponding author, E-mail: 529885477@qq.com**

Abstract:
Traditional vernacular dwellings in the Jianghan Plain, as material embodiments of the long-term interaction among regional history, society, economy, and the natural environment, carry collective historical memory and cultural identity, forming distinctive and relatively stable cultural genes manifested in spatial adaptation, ritual order, decorative symbolism, and belief systems and craftsmanship traditions. However, under the pressures of globalization and rapid urbanization, both these dwellings and the cultural genes they embody are increasingly at risk of weakening and dissolution. In response, this study introduces the theoretical framework of cultural genes within a cultural management perspective to systematically examine their structural characteristics and transmission challenges, and to construct a multi-dimensional framework for heritage continuity. The study aims to promote a shift from form-oriented preservation to mechanism-oriented reconstruction, thereby providing theoretical support for mitigating the homogenization of regional architecture and enabling the contemporary expression and sustained transmission of cultural genes, while offering practical insights for rural revitalization and the reconstruction of cultural identity.

Keywords:
Jianghan Plain; Vernacular Dwellings; Cultural Genes; Cultural Management; Transmission Pathways

1. Theoretical Framework: Cultural Genes and Cultural Management

1.1 Cultural Genes: Structure and Transmission

The concept of cultural genes originates from an interdisciplinary borrowing of biological genetic mechanisms and refers to the core units of cultural information formed and sustained within specific natural environments and socio-historical processes, characterized by stability, recognizability, and transmissibility [1]. In essence, cultural genes are not merely individual symbols or surface forms, but structural elements that underpin the generation, evolution, and dissemination of culture. They are manifested not only in material forms, but also embedded in behavioral norms and value systems, and are continuously replicated, varied, and selected across multiple carriers in time and space, thereby constituting the intrinsic mechanism of cultur-

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al continuity.

In the field of architectural heritage studies, cultural genes are extended to denote the fundamental informational units that constitute the distinctive characteristics of regional architectural culture, emphasizing their continuity over time and structural stability. From this perspective, traditional vernacular dwellings are no longer understood as mere assemblages of material forms, but as complex systems composed of multi-layered cultural information. Structurally, cultural genes exhibit a hierarchical configuration in which material representation, technical logic, and value systems are interwoven. The outer layer is manifested in spatial forms and architectural features, providing a direct basis for cultural recognition; the intermediate layer is embodied in construction techniques and environmental adaptation strategies, linking physical form with cultural meaning; and the inner layer corresponds to the spiritual dimension shaped by social structures and cultural values, continuously reinforced through spatial order and everyday practices. The interaction of these layers results in a nested structure that maintains identifiable characteristics throughout historical evolution. [2]

In terms of transmission mechanisms, cultural genes are not perpetuated through static replication but through a dynamic balance between stability and variation. Core elements remain relatively stable over time, forming the foundation of cultural identity and spatial order, while peripheral elements undergo adaptive modification in response to changing social demands and technological conditions. Therefore, the essence of cultural transmission lies not in the reproduction of form, but in the continuity of structural logic and meaning, whereby traditional culture is reinterpreted and reconfigured to achieve regeneration and renewal within contemporary contexts.

1.2 Cultural Management: Governance Frameworks and Strategic Transformation

As a key concept at the intersection of cultural heritage conservation and public governance, cultural management has evolved from an early administrative, government-led model toward a systemic mechanism centered on resource integration and collaborative governance. In the contemporary context, cultural management is no longer confined to the unilateral preservation of cultural objects; rather, it promotes the continuous generation and transformation of cultural value through multidimensional approaches, including resource allocation, institutional design, and stakeholder coordination [3]. This shift signifies a paradigmatic transition in heritage conservation from an object-oriented approach to a system-oriented framework.

From the perspective of governance structure, cultural management has undergone a transformation from single-actor dominance to multi-actor collaboration. In contrast to traditional models centered on government authority, contemporary approaches emphasize the coordinated participation of governments, professional institutions, market actors, and the public. Through the integration of institutional provision, expert knowledge, and social practice, a composite governance system is established. Within this framework, cultural resources are no longer regarded as static entities to be preserved, but as composite assets with multiple value potentials, whose historical, ecological, and social values can be dynamically reproduced, thereby alleviating the structural tension between conservation and development. [4]

At the operational level, this transformation is further reflected in a shift from static preservation to dynamic operation. On the one hand, the scope of management has expanded from individual heritage entities to integrated systems encompassing spatial environments, social relations, and cultural practices, emphasizing the

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continuity and integrity of cultural landscapes [5]. On the other hand, governance mechanisms have moved away from reliance on external inputs toward internally driven sustainability, activating cultural systems through community participation, cultural dissemination, and industrial transformation.

In essence, the core of cultural management lies not in the static maintenance of existing forms, but in enabling the continuous operation and regeneration of cultural systems through the coordinated interplay of institutional, technological, and social mechanisms. This perspective provides a critical theoretical foundation and methodological guidance for the conservation and adaptive transformation of regional cultural heritage, including traditional vernacular dwellings.

2. Cultural Disruption and Contemporary Challenges of Vernacular Dwellings in the Jianghan Plain

2.1 Loss of Material Cultural Genes: Spatial Reconfiguration and Morphological Dissolution

2.1.1 Fragmentation of Settlement Fabric and the Deconstruction of Spatial Order

The “yuanzi” settlement pattern of the Jianghan Plain constitutes a fundamental spatial basis for the material cultural genes of traditional vernacular dwellings. Its construction logic—characterized by building along embankments and organizing layouts in accordance with water systems—has historically enabled a highly integrated and organic relationship among waterways, farmland, and residential units. However, with the improvement of modern hydraulic infrastructure and the expansion of road networks, the original water-oriented spatial organization has gradually been replaced by transportation-driven and administratively defined layouts, resulting in a shift from water-oriented settlement patterns to road-oriented expansion.

This transformation has weakened the coupling between settlements and their natural environment. Boundary structures and neighborhood interaction spaces, once shaped by water systems, have gradually disappeared, leading to the fragmentation of settlement fabric. Consequently, spatial order has shifted from an ecologically adaptive logic toward externally imposed and standardized patterns. [6]

2.1.2 Architectural Morphological Transformation and the Erosion of Regional Identity

Against the backdrop of standardized construction methods and the widespread use of new materials, the morphological logic of traditional vernacular dwellings—characterized by elevated platforms, sloped roofs, and timber structural systems—has been progressively replaced by homogenized residential forms dominated by brick–concrete structures. Changes in scale, proportion, and construction methods have made it difficult to sustain the spatial experience originally shaped by climatic adaptation and environmental responsiveness. [7]

At the same time, the decline of traditional materials and construction details has led to a gradual loss of regional recognizability. The inherent disjunction between modern construction systems and traditional building logic further constrains the continuity of vernacular forms within contemporary building contexts, causing them to shift from structural expressions toward superficial symbolic representations.

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2.1.3 Resource Misallocation and the "Islandization" of Heritage Conservation

Under the combined effects of functional transformation and imbalanced resource allocation, the spatial use patterns of traditional vernacular dwellings have undergone significant changes. Composite spaces that once integrated production and daily life have been compressed, while courtyards and ancillary spaces are used less frequently, resulting in increasingly simplified spatial organization and a gradual detachment of buildings from their original generative logic. At the same time, due to the absence of integrated planning and systematic conservation, the renewal of traditional dwellings is often carried out in a fragmented, building-by-building manner. The lack of effective coordination between old and new spaces has led settlements to shift from cohesive continuity to dispersed configurations, giving rise to a condition of "islandization." This structural fragmentation weakens the collective expression of cultural genes at the settlement scale.

Overall, the loss of material cultural genes is not merely the disappearance of individual forms, but the result of coordinated transformations in settlement structure, architectural morphology, and patterns of use. Fundamentally, it reflects the replacement of traditional spatial production mechanisms by modern construction systems, leading to the erosion of stable material carriers and the reproductive basis of cultural genes, and ultimately to the overall decline of regional architectural identity.

2.2 Disruption of Social Cultural Genes: Social Transformation and the Decline of Ritual Order

2.2.1 Weakening of Kinship Structures and the Decline of Spatial Ritual Functions

Social cultural genes are deeply embedded in kinship structures and ritual norms, and are continuously expressed through the organization and use of vernacular dwelling spaces. Traditional dwellings are typically organized around a central hall (tangwu), forming a centripetal spatial sequence that not only accommodates residential functions but also supports ancestral worship, life-cycle rituals, and family deliberations, thereby materializing ritual order. However, with increasing population mobility and the transition from extended families to nuclear households, kinship-based communities have gradually weakened, making it difficult to sustain spatial usage patterns rooted in lineage relations. The decline of ritual practices has led to the progressive loss of ceremonial functions in key spaces such as the central hall, which are increasingly repurposed for everyday or auxiliary uses. As a result, the traditional spatial hierarchy—characterized by distinctions between inner and outer domains and generational order—has been significantly diminished, and vernacular dwellings have shifted from being carriers of ritual order to primarily functional residential spaces, accompanied by a marked contraction of their socio-cultural significance. [8]

2.2.2 Decline of Cooperative Communities and Public Spaces

In traditional settlements, cooperative mechanisms rooted in water management, flood control, and agricultural production established a closely interconnected social network linking vernacular dwellings and public spaces. Spaces such as threshing grounds, alleyways, and waterfront areas not only served productive functions but also acted as key venues for neighborhood interaction and collective activities, sustaining internal community relations. However, with the transformation of governance systems and lifestyles, these collaboration-based relationships—once grounded in close-knit social structures—have gradually been replaced

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by functionalized management and individualized living patterns. As a result, public spaces have been compressed or reconfigured in the process of modernization, leading to a weakening of their social functions. Vernacular dwellings have consequently shifted from open units embedded within social networks to relatively enclosed individual spaces, with increasingly fragmented spatial connections, declining settlement cohesion, and the gradual disintegration of the original symbiotic relationship among people, land, and dwelling.

2.2.3 Shift in Value Perception and the Weakening of Grassroots Transmission Capacity

Against the backdrop of social transformation and shifting cultural values, the structure of value perception surrounding traditional vernacular dwellings has undergone significant change. Within the context of modernization, some groups increasingly regard traditional architecture as a symbol of backwardness, while associating standardized and urbanized housing forms with progress, leading to a perceptual bias against local architectural heritage. This shift in value perception directly influences decisions related to the use and transformation of vernacular dwellings, resulting in a continuous decline in residents' willingness to engage in conservation practices. At the same time, existing cultural management systems remain insufficient in guiding value recognition and fostering cultural identity, failing to effectively bridge traditional culture with contemporary life. Consequently, transmission at the grassroots level lacks endogenous motivation, and social cultural genes have shifted from institutional weakening toward cognitive erosion, emerging as a fundamental constraint on the continuity of vernacular dwellings. [9]

2.3 Disruption of Social Practice: Craft Discontinuity and the Loss of Experiential Knowledge

2.3.1 Disruption of Craft Lineages and the Fragmentation of Experiential Knowledge

The construction of traditional vernacular dwellings relies on a craft-centered knowledge system, in which experiential knowledge is transmitted across generations through apprenticeship and on-site practice. This informal knowledge system encompasses key aspects such as structural proportions, material processing, and environmental adaptation, serving as a crucial carrier of local building wisdom. However, with the continued migration of labor to urban areas, rural artisan groups have become increasingly aged, while the number of apprentices has declined significantly, making it difficult to sustain traditional transmission chains. In this process, many technique-specific details—highly dependent on experiential judgment—have been lost with the withdrawal of senior craftsmen, leading to the gradual fragmentation of what was once a systematic body of construction knowledge and weakening its capacity to support contemporary building and restoration practices.

2.3.2 Misalignment of Construction Paradigms and the Decline of Local Material Systems

A growing misalignment has emerged between traditional craft logic and modern engineering systems. Standardized design and industrialized construction methods are often incompatible with the experience-based principles of traditional building practices, such as adapting construction to available materials and responding flexibly to site conditions, resulting in structural differences in both technical approaches and evaluation criteria. At the same time, the decline of local material supply systems has undermined the mate-

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rial foundation upon which traditional construction depends. In practice, the substitution of modern materials and techniques for traditional methods may satisfy short-term functional requirements but often disrupts original structural relationships and material performance. As a result, buildings tend to retain outward forms while losing their intrinsic logic, making it difficult for traditional construction systems to be sustained within contemporary contexts.

2.3.3 Insufficient Institutional Support and the Decline of Practical Motivation

The intensification of craft discontinuity is closely linked to the lack of effective support within cultural management frameworks. Existing conservation systems tend to focus on the registration and control of heritage objects, while paying insufficient attention to construction actors and their practices, thereby failing to establish meaningful connections between craft transmission and contemporary building demands. On the one hand, current construction qualification systems and industry regulations impose institutional barriers that exclude traditional craftsmen from formal restoration projects; on the other hand, the higher cost and lower efficiency of traditional techniques reduce their competitiveness within market-driven systems. In the absence of adequate institutional incentives and value recognition, craft practices have become increasingly marginalized, leading to the gradual breakdown of the social practice chain that sustains them.

Overall, the disruption of social practice has progressively severed the internal connections among artisan systems, experiential knowledge, and construction contexts. As a result, the practical foundation upon which traditional vernacular dwellings are generated and sustained has been fundamentally weakened. This not only manifests as a decline in craftsmanship but also results in the loss of the capacity for cultural genes to be continuously activated and reproduced within real-world construction activities, thereby accelerating the weakening of the overall cultural system of vernacular dwellings.

3. Pathway Construction: Transmission Mechanisms from a Cultural Management Perspective

3.1 Conservation of Authenticity: Spatial Restoration and Holistic Maintenance

Authenticity-based conservation extends beyond the preservation of material form to encompass the safeguarding of cultural meanings and social contexts embedded within heritage. From a cultural management perspective, its core lies in achieving the coordinated continuity of "form–system–meaning," whereby the preservation of spatial structures is integrated with the maintenance of their generative logic and patterns of use, enabling both tangible and intangible dimensions of heritage to persist as an interconnected whole. This shift signifies a transition from form-oriented restoration to mechanism-oriented continuity, emphasizing the sustained expression of cultural genes within both spatial configurations and social practices.

At the level of implementation, spatial restoration should move from superficial renewal toward refined and context-sensitive intervention. First, the principle of minimal intervention should be upheld, prioritizing structural stabilization and localized repair while preserving historical stratification and slowing material deterioration. Second, attention should be given to the recovery of traditional construction logic using original materials and techniques wherever feasible, supported by the integration of craft documentation and artisan

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knowledge systems, thereby aligning restoration with craft transmission. Third, without altering the overall spatial configuration, moderate functional adaptation should be introduced to improve usability and prevent abandonment due to obsolescence. Moreover, the scale of conservation should expand from individual buildings to the settlement, ensuring the coordinated management of spatial fabric, skyline, and environmental elements to maintain structural coherence and landscape continuity. [10]

At the operational level, authenticity-based conservation depends on the integration of community participation and institutional support. Residents' everyday practices constitute a fundamental component of spatial authenticity, and their continued habitation and engagement should be supported through incremental renewal strategies and policy measures. In parallel, digital documentation, graded conservation systems, and collaborative governance frameworks should be employed to regulate restoration processes and enhance public recognition. In essence, authenticity-based conservation should not be understood as the static preservation of historical forms, but as a dynamic process grounded in spatial restoration and sustained through integrated maintenance, enabling traditional vernacular dwellings to continuously embody cultural meaning and social function in contemporary contexts.

3.2 Craft Continuity: Translation and Knowledge Regeneration

Compared with the restoration of physical space, craft continuity more directly concerns the reproduction of cultural genes at the level of practice. The construction techniques of traditional vernacular dwellings are not isolated procedures but constitute a composite knowledge system integrating material cognition, construction experience, and environmental adaptation strategies. Their effective functioning depends on sustained building activities and supportive social contexts. In the context of disrupted craft systems and the loss of experiential knowledge, purely archival forms of preservation are insufficient to sustain craft transmission; instead, it is necessary, within a cultural management framework, to reconstruct its practical foundation through processes of contemporary translation and experiential regeneration.

At the level of pathways, craft continuity should shift from static documentation toward practice-based activation. This can be achieved by embedding traditional techniques into restoration and construction projects, thereby reintegrating them into productive processes. At the same time, the establishment of artisan registries and craft databases can help create sustainable application contexts, enabling transmission through practice. Building on this, contemporary translation should be advanced by adapting materials, structural systems, and spatial strategies while retaining core construction logic and principles, allowing traditional techniques to be integrated into modern building systems. This process emphasizes the structural extraction and reconfiguration of experiential knowledge rather than the replication of surface forms, thereby preventing the functional obsolescence and symbolic reduction of traditional crafts in contemporary contexts.

At the implementation level, the regeneration of experiential knowledge relies on the coordinated support of institutional and educational systems. On the one hand, professional certification and training mechanisms should be established to provide institutional access for traditional craftsmen to participate in contemporary construction practices. On the other hand, local construction knowledge should be incorporated into design education and practice-based teaching, fostering a new generation of practitioners through the integration of academia and industry. In addition, by linking traditional crafts with public projects and cultural industries,

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their application scenarios can be expanded, enhancing both social visibility and economic viability. Overall, craft continuity should not be understood as unilateral preservation, but as a process of dynamic renewal through ongoing use and translation, enabling cultural genes to regain their capacity for growth within practical contexts.

3.3 Community Participation: Multi-Actor Collaboration and Dynamic Operation

The value of traditional vernacular dwellings does not reside solely in their physical form, but is continuously activated and reproduced through residents' everyday use and social interactions. From a cultural management perspective, this requires a shift in transmission strategies from object-oriented preservation to subject-oriented activation, whereby the operational foundation of the cultural system is reconstructed through multi-actor collaboration.

At the level of pathways, community participation is first manifested in the transition from single-actor governance to collaborative governance. Through institutional design, multiple stakeholders—including government agencies, professional institutions, market actors, and local residents—are engaged in a coordinated framework with clearly defined roles and responsibilities: governments provide policy guidance and resource allocation, professional actors offer planning and technical support, market entities contribute to operation and revitalization, and residents serve as core agents in spatial maintenance and cultural practices. At the same time, cultural operation should be grounded in local everyday life by reconstructing usage scenarios through incremental renewal strategies. This includes improving living conditions while preserving spatial configurations, and embedding festivals and vernacular practices into public spaces, thereby reintegrating architecture into community life.

At the implementation level, effective multi-actor collaboration depends on institutional support and incentive mechanisms. On the one hand, clarifying property rights and benefit-sharing arrangements can safeguard residents' participation and entitlements, strengthening their agency. On the other hand, policy instruments such as subsidies, revenue-sharing models, and the provision of public services can enhance sustained engagement. The introduction of intermediary actors—such as community planners or local organizations—can further facilitate coordination among stakeholders. Overall, the essence of community participation lies in transforming traditional dwellings from passive objects of conservation into actively operating systems, enabling them to achieve self-sustained continuity and dynamic renewal through local practices, and thereby maintaining the living transmission of cultural genes.

3.4 Digital Dissemination: Archival Systems and Information Transformation

Digital technologies enable the overcoming of spatial and temporal constraints by transforming dispersed cultural information into data resources that are storable, analyzable, and disseminable, thereby providing a sustained technical foundation for cultural management. The key lies in establishing archival and transformation mechanisms that systematically translate cultural genes from experiential forms into data-based representations.

At the level of pathways, it is first necessary to construct a systematic digital documentation framework that enables the multi-dimensional collection and integration of spatial forms, structural features, material

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information, and historical evolution of traditional vernacular dwellings. Through methods such as 3D scanning, visual recording, and textual documentation, cultural information that previously relied on experiential perception can be converted into structured data, forming hierarchical and categorized database systems with capabilities for querying, comparison, and dynamic updating. On this basis, information transformation and dissemination should be advanced through visualization and narrative reconstruction, translating specialized architectural knowledge into forms accessible to the public. Approaches such as digital exhibitions, virtual reconstructions, and immersive experiences can expand the scope of dissemination and enhance cultural awareness.

At the implementation level, digital dissemination should be embedded within the broader cultural management system to establish mechanisms for sustained operation. On the one hand, data updating and sharing frameworks should be developed to ensure that documentation outcomes are continuously refined through processes of restoration and use, thereby avoiding data stagnation and fragmentation. On the other hand, by integrating digital resources with education, cultural tourism, and public services, their application scenarios can be expanded, facilitating the transformation of cultural value into social benefits. Overall, digital dissemination is not merely the application of technological tools, but a reconfiguration of modes of cultural expression, enabling traditional vernacular dwellings to achieve sustained continuity and expansion across both physical and digital spaces.

3.5 Institutional Frameworks: Policy Support and Collaborative Governance

From a cultural management perspective, institutions function not merely as instruments of constraint but as key mechanisms for resource integration, stakeholder coordination, and behavioral guidance. Their core role lies in establishing a stable and sustainable environment for heritage transmission through policy provision and collaborative governance, thereby enabling the effective alignment and implementation of multiple pathways in practice.

At the level of pathways, a differentiated institutional framework should be established to address diverse conservation needs. For dwellings with high historical value and integrity, clearly defined protection levels and regulatory requirements are necessary to ensure the continuity of spatial configurations and morphological characteristics. For more ordinary vernacular dwellings, adaptive renewal and functional transformation may be permitted on the premise of maintaining overall character, thereby enhancing their practical usability. At the same time, policy instruments such as financial subsidies, tax incentives, and technical support should be employed to reduce conservation costs and encourage multi-actor participation. In terms of governance structure, a shift is required from single-actor administrative control toward a collaborative governance model, forming a coordinated system in which governments, professional institutions, market actors, and local communities operate with clearly defined roles and responsibilities.

At the implementation level, institutional support must emphasize dynamic adaptability and sustained operation. On the one hand, monitoring, evaluation, and feedback mechanisms should be established to track conservation outcomes and to adjust policies and technical standards in a timely manner. On the other hand, pilot projects and the dissemination of best practices can facilitate constructive interaction between institutional frameworks and practical implementation. Meanwhile, legal frameworks and clear delineation of rights

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and responsibilities should be strengthened to provide a stable institutional foundation for the conservation of vernacular dwellings. Overall, the effectiveness of institutional support lies not in the formulation of isolated policies, but in the creation of a multi-level governance environment with endogenous driving forces, enabling the conservation of traditional dwellings to evolve from a series of short-term interventions into a long-term and stable social process.

4. Path Integration: Coordinated Operation of Transmission Mechanisms

4.1 Structural Integration: Systematic Linkages Across Multiple Pathways

In the preceding pathway construction, authenticity-based conservation, craft continuity, community participation, digital dissemination, and institutional support address the transmission of vernacular dwellings from the dimensions of materiality, practice, society, technology, and governance. However, if these pathways operate independently, they are likely to produce a fragmented framework that cannot sustain the holistic continuity of the cultural system. Therefore, from a cultural management perspective, it is necessary to integrate these pathways structurally by establishing hierarchical linkages and coordinated mechanisms, thereby constructing an internally coherent system.

From the perspective of structural and operational logic, multi-path integration is manifested in the functional coupling and coordinated interaction among different dimensions. Spatial restoration provides the material foundation, craft continuity enables the reproduction of practices, community participation sustains the social basis of operation, digital dissemination expands modes of expression and communication, and institutional support regulates resource allocation and governance processes. Rather than forming a simple aggregation, these elements constitute a progressive structure of "material foundation–practical transformation–social embedding–technological extension– institutional support." Within this framework, interactive feedback mechanisms emerge across pathways: restoration practices facilitate the application of traditional techniques, community experiences are translated into digital content, and institutional systems regulate and coordinate the entire process. Such interactions ensure the orderliness and stability of the overall system.

From a temporal perspective, multi-path integration further unfolds as a process of phased advancement and dynamic updating. The transmission of vernacular dwellings is not a one-time intervention but an evolving system: in the initial stage, spatial restoration and institutional construction establish material and managerial foundations; in the intermediate stage, craft continuity and community participation reinforce practical and social support; and in the later stage, digital dissemination and diversified utilization expand social impact and value transformation. Through this progression, the transmission mechanism shifts from localized, single-dimensional repair toward system-oriented governance based on multi-path coordination, enabling cultural genes to achieve continuous expression and dynamic renewal within a stable yet adaptive framework.

4.2 Coordinated Operation: Multi-Actor Mechanisms and Collaborative Governance

Building upon the structural integration of multiple pathways, the sustained operation of vernacular dwelling transmission depends on the effective construction of multi-actor collaborative mechanisms. Compared with governance models dominated by a single actor, the cultural management perspective emphasizes the

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integration of diverse stakeholders within an institutional framework, enabling functional complementarity and systemic coordination, and transforming the transmission system from structural integration to dynamic operation.

In terms of institutional configuration, multi-actor collaboration centers on governments, professional institutions, market actors, and local communities. Governments provide policy frameworks and resource allocation; professional institutions offer technical support and evaluative expertise; market actors contribute to operation and value transformation; and local communities sustain everyday practices and cultural continuity. Through clearly defined roles and negotiated responsibilities, these actors form a stable division of labor, supported by cross-sector coordination platforms and intermediary agents—such as community planners or operational organizations—to facilitate regular interaction and enhance decision-making efficiency. Meanwhile, the establishment of benefit-sharing mechanisms based on clear property rights, combined with subsidies and risk-regulation measures, strengthens long-term participation incentives.

At the operational level, collaborative mechanisms must incorporate dynamic adaptability. On the one hand, monitoring, evaluation, and feedback systems should be implemented to continuously assess and optimize the effectiveness of transmission pathways. On the other hand, digital platforms can be utilized to integrate data and document processes, improving transparency and traceability in governance. Through these mechanisms, multi-actor collaboration evolves from static coordination into a sustained governance process, enabling the integration of resources and the regeneration of cultural value, and ultimately facilitating the transition from short-term conservation efforts to a long-term, self-sustaining development model.

5.Conclusion

This study, grounded in the concept of cultural genes and a cultural management perspective, systematically examines the structural characteristics, challenges, and transmission pathways of vernacular dwellings in the Jianghan Plain. The findings indicate that such dwellings constitute a composite cultural system integrating material structures, social relations, and practical knowledge, within which cultural genes operate as a multi-layered mechanism. Under the pressures of modernization, spatial reconfiguration, the weakening of ritual order, and the disruption of craft practices jointly lead to the decoupling of cultural genes from their material carriers and operational contexts, resulting in systemic fragmentation. In response, this study constructs an integrated framework combining authenticity-based conservation, craft continuity, community participation, digital dissemination, and institutional support, and further proposes a model of structural integration and multi-actor collaboration to enable coordinated and sustained transmission. This approach shifts heritage conservation from form-oriented preservation to mechanism-oriented continuity, emphasizing the dynamic reproduction of cultural genes through systemic governance. More broadly, the study reconceptualizes vernacular heritage as a dynamic and regenerative system, highlighting the importance of aligning cultural values with contemporary socio-economic contexts and advocating for interdisciplinary approaches and localized practices. Future research may further explore quantitative evaluation methods and case-based applications to enhance the operability and adaptability of the proposed framework.

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