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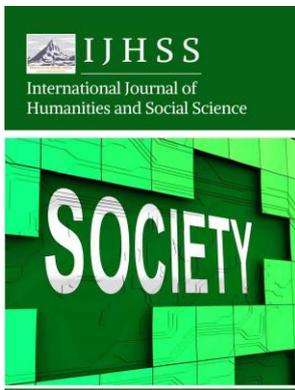
Mediating Living Heritage: A Research-through-Design Approach to Sustainable Interior Strategies for Shanxi Lacquerware

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Abstract: This study investigates how interior design interventions can enhance the sustainability of living heritage through experiential and participatory spatial strategies. Using a lacquerware studio in Shanxi Province, China, as a research-through-design case, the project explores how interior space can mediate relationships between traditional craftsmanship, contemporary consumption, and cultural transmission. Grounded in the concept of living heritage and aligned with United Nations Sustainable Development Goal 12 (Responsible Consumption and Production), the research adopts a qualitative, practice-led methodology in which design functions as a mode of inquiry. Through material experimentation, spatial prototyping, and contextual analysis, the study proposes a "Scrap-to-Texture" material strategy and a topological spatial layout to foster public engagement and material reuse. Findings suggest that interior design can serve not merely as a representational medium, but as an active agent in reconfiguring heritage practices within everyday contexts, thereby contributing to sustainable cultural continuity.

Keywords: Intangible Cultural Heritage (ICH); sustainable interior design; Research through Design (RtD); Material Upcycling; spatial topology; Shanxi lacquerware

1. Introduction

Living heritage practices, particularly traditional crafts, face increasing challenges within contemporary systems of production and consumption. Although widely recognized for their cultural and historical significance, their long-term sustainability is often undermined by ageing practitioner communities, declining modes of transmission, and limited relevance to modern lifestyles [1]. In the Chinese context, Shanxi lacquerware craftsmanship exemplifies these pressing issues. Despite its material durability, sophisticated techniques, and rich cultural lineage, lacquerware increasingly struggles to engage younger generations and to align with contemporary patterns of use and consumption [2]. Consequently, many preservation efforts remain largely symbolic, offering visibility and institutional recognition without ensuring practical continuity or social relevance. This gap between preservation and practice highlights a critical need for approaches that integrate living heritage into the rhythms of everyday life.

Parallel to these cultural challenges, global sustainability discourse has progressively emphasized the role of design in mediating between social, cultural, and environmental systems. The United Nations Sustainable Development Goal (SDG) 12 explicitly calls for

ensuring sustainable consumption and production patterns, providing a robust framework for re-evaluating heritage practices not as relics of the past, but as active, evolving components of sustainable development [3]. However, dominant models of heritage safeguarding often prioritize museumization, archival documentation, and static display. These approaches, while valuable for conservation, can inadvertently distance heritage from the public, reinforcing perceptions of it as fragile, sacred, and inaccessible to non-experts [4]. This creates a paradox where heritage is protected yet isolated, admired yet not practiced, thereby stifling its potential for intergenerational transmission and community vitality.

This research posits that interior design, as a discipline concerned with the shaping of human experience within built environments, holds significant potential to address this disconnect. By strategically designing spaces that encourage interaction, participation, and multi-sensory engagement, interior design can act as a mediating agent between traditional craft and contemporary society. To explore this potential, the study is guided by the following research question: How can interior design interventions support the sustainability of living heritage through experiential and participatory spatial strategies?

To investigate this question, the study adopts a Research through Design (RtD) methodology, treating the design process itself as a primary mode of inquiry [5]. The lacquerware studio in Yuncheng City, Shanxi Province, serves as the central case study and design prototype. Rather than presenting a final, closed architectural solution, the research uses the iterative development of the studio's interior, from material analysis to spatial prototyping, to explore theoretical propositions about heritage, sustainability, and spatial experience. The design intervention is deliberately situated within Wanda Plaza, a high-traffic commercial complex, to directly challenge the conventional isolation of heritage sites and to test strategies for reintegrating craft into the daily consumption environments of younger demographics.

The contribution of this paper is therefore twofold. Firstly, it offers a concrete, design-led exploration of how spatial strategies, such as topological fluidity, visual transparency, and zones of graduated participation, can foster engagement with Intangible Cultural Heritage (ICH). Secondly, it articulates how material innovation, specifically the upcycling of lacquer production waste into spatial finishes, can visually and physically embody the principles of SDG 12, making sustainability an integral part of the heritage narrative itself. Through this dual focus on space and material, the study aims to demonstrate how interior design can operate not merely as a backdrop for heritage display, but as an active framework for its sustainable continuation.

2. Literature Review

2.1. Living Heritage as Practice Rather than Object

The conceptual evolution of Intangible Cultural Heritage (ICH) has marked a significant shift from viewing heritage primarily as a collection of material objects to understanding it as a dynamic, living practice embedded in social and cultural processes. This perspective, now widely acknowledged in scholarly discourse, posits that the essence of heritage lies not in static artefacts but in the continuous enactment, transmission, and adaptation of skills, knowledge, rituals, and expressions within communities. The sustainability of heritage, therefore, hinges less on isolated conservation efforts and more on fostering the ecological, social, and economic conditions that enable these practices to remain relevant and vibrant [6]. Despite this paradigm shift, a discernible implementation gap persists. Numerous heritage interventions, particularly those institutionalized through policy and museum practice, continue to emphasize documentation, archival preservation, and representational display. Such approaches, while contributing to record keeping and raising awareness, risk objectifying living traditions. They can subtly reinforce a separation between heritage and the contemporary lifeworld, transforming active practices into curated exhibits observed rather than lived [7]. This disconnection is

acutely felt in the realm of traditional craftsmanship. Crafts such as Shanxi lacquerware involve complex, time intensive techniques and specialized knowledge that are often perceived as esoteric or inaccessible to outsiders. When heritage is presented primarily through finished products behind glass, the process, the labor, and the embodied knowledge of the artisan remain hidden. This can lead to a scenario where heritage is culturally valued but socio economically marginalized, admired aesthetically but not engaged with practically [8]. Consequently, recent scholarship strongly advocates for participatory and experiential models that move beyond passive spectatorship. These models aim to bridge the gap between heritage bearers and the public by creating opportunities for hands on engagement, co creation, and immersive learning, thereby reinforcing the "living" dimension of ICH [9].

2.2. Sustainability Beyond Environmental Metrics

The concept of sustainability within design and heritage studies has undergone substantial expansion. While reducing environmental impact and promoting material efficiency remain critical goals, there is a growing consensus that a robust framework for sustainability must be multidimensional, integrating social, cultural, and economic pillars alongside ecological concerns [10]. From this holistic viewpoint, sustainable development involves the preservation and enhancement of cultural diversity, community wellbeing, intergenerational equity, and local knowledge systems. The United Nations Sustainable Development Goals (SDGs), particularly Goal 12 on Responsible Consumption and Production, provide a crucial macro framework that aligns heritage practices with global sustainability agendas. SDG 12 encourages more efficient resource use, sustainable infrastructure, and awareness of lifestyles in harmony with nature, offering a lens through which traditional crafts can be re evaluated as models of circularity, low impact production, and ethical consumption [11]. However, a significant challenge lies in operationalizing these broad principles at the grassroots level where heritage is practiced. Policy frameworks and theoretical models alone cannot ensure sustainability; they require translation into tangible mechanisms that alter everyday behaviors, economic models, and spatial experiences [12]. This is where design, and specifically spatial and interior design, assumes a pivotal role. Design acts as a mediating practice that can materialize abstract sustainability goals into concrete forms, atmospheres, and interactions. By shaping the environments where heritage is produced, consumed, and learned, interior design can make sustainability visible, tactile, and integral to the heritage experience itself. It can, for instance, showcase material reuse, facilitate social interaction around craft, or create economic linkages that support artisans, thereby demonstrating how cultural sustainability and environmental responsibility can be synergistically pursued.

2.3. Research through Design as a Methodological Bridge

To effectively investigate the complex interplay between living heritage, sustainability, and spatial design, this study employs a Research through Design (RtD) methodology. RtD is predicated on the understanding that design activity constitutes a legitimate and productive form of knowledge production. It posits that the process of designing, making, prototyping, and iterating, can generate insights that are difficult to attain through purely verbal or analytical research methods [13]. Within the context of ICH, where knowledge is often tacit, embodied, and context dependent, RtD offers a particularly apt approach. It allows the researcher to engage directly with materials, spatial configurations, and user interactions, using the design project as a "laboratory" to probe theoretical questions. In this framework, design proposals and prototypes are not merely end products but are treated as epistemic objects. They serve as tangible hypotheses that embody and test ideas about how space can mediate heritage practice, how materials can narrate sustainable cycles, and how participation can be spatially encouraged [14]. This methodology embraces iteration and reflection, allowing the

research to evolve in response to findings that emerge from the act of designing. By adopting an RtD approach for the Shanxi lacquerware studio project, this study aims to contribute a form of practical, design led knowledge to the discourse on heritage sustainability. It seeks to demonstrate how spatial and interior design strategies, developed through a rigorous process of making and reflection, can offer concrete, transferable insights into sustaining living heritage in the contemporary world [15].

3. Methodology

This study employs a qualitative, practice led Research through Design (RtD) methodology to explore how interior design can mediate the sustainability of living heritage. The choice of RtD is pivotal as it frames the act of designing not merely as an outcome oriented project but as the core mode of investigation itself. In this paradigm, knowledge is generated through iterative cycles of making, prototyping, evaluating, and reflecting. The design of the lacquerware studio serves as the central epistemic artefact through which theoretical propositions regarding spatial mediation, participatory engagement, and material sustainability are materially instantiated, tested, and refined. This methodology is particularly appropriate for engaging with Intangible Cultural Heritage (ICH), which is characterized by embodied skills, contextual knowledge, and social practice elements that are often inadequately captured through purely discursive or observational research methods. The research process is visualized in the following diagram (Figure 1).
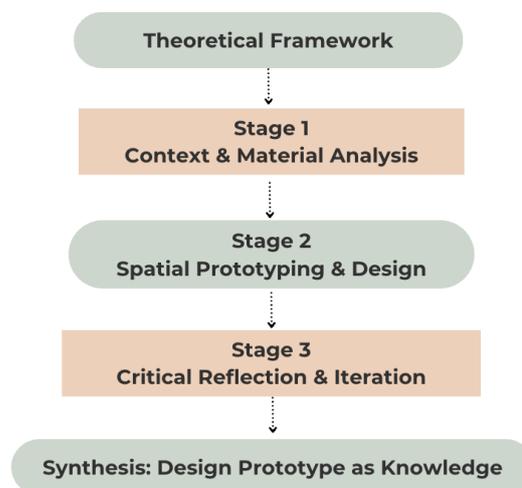
Figure 1. Research through Design Process Diagram.

3.1. Case Selection and Contextual Grounding

The research is rigorously grounded in the specific socio cultural and material context of Shanxi lacquerware craftsmanship, with a focus on Yuncheng City. This region was selected due to its historical significance as a hub for high quality lacquer production and its contemporary status as a site where this living heritage faces tangible threats to its continuity. These threats include a diminishing number of master artisans, a lack of effective transmission to younger generations, and an economic model that struggles within modern market systems. The case study approach allows for a deep, situated investigation that respects the particularities of the craft, its community, and its regional ecosystem.

A fundamental methodological decision was the selection of the project site within Wanda Plaza, a contemporary, high footfall commercial mall in Yuncheng. This decision is a deliberate intervention into conventional heritage presentation paradigms. By placing

the lacquerware studio within a bustling space of everyday consumption rather than a dedicated cultural institution, the research actively tests a hypothesis: that spatial integration into modern lifeworld can foster new forms of engagement and relevance. This context forces the design inquiry to directly address questions of accessibility, commercial viability, and the negotiation between traditional craft aesthetics and contemporary retail environments, making the location an active variable within the research design.

3.2. Research Process and Iterative Stages

The research process was structured into three primary, non linear, and iterative stages, as depicted in Figure 1. Each stage generated specific forms of knowledge that informed the others, creating a coherent yet flexible investigative trajectory.

The first stage, Contextual and Material Analysis, established the empirical and conceptual foundation. It began with a thorough investigation of the lacquerware craft process, not only as a sequence of technical steps but as a holistic system involving materials, labor, time, and waste. A critical component was the forensic analysis of production waste, specifically the cured lacquer scraps from polishing. This involved hands on material experimentation to assess their physical properties, aesthetic potential, and possibilities for aggregation and reuse. This stage moved the concept of sustainable material use from an abstract principle to a tangible design challenge, asking how waste could be reconceptualized as a primary, narrative rich material for the interior environment.

The second stage, Spatial Prototyping and Conceptual Design, translated insights from the material analysis into three dimensional spatial proposals. Guided by the concept of Topological Space which emphasizes continuous transformation and connectivity over fixed geometries this stage explored fluid interior layouts. The design process involved generating floor plans and sections where walls were conceived not as static barriers but as continuous, curving surfaces that define zones while maintaining visual and spatial relationships. Digital and physical models were used extensively to study visitor circulation, sightlines, and the experiential journey from public retail space to semi private workshop. Key design elements, such as the organic shaped windows in the partition wall, were prototyped to mediate visibility and interaction between visitors and artisans.

The third and ongoing stage, Critical Reflection and Iterative Refinement, provided the essential evaluative framework. At every step, design decisions were rigorously reflected upon against the study's core objectives: Desanctifying heritage, enabling participatory experience, and manifesting sustainability materially. This reflection was not a singular final review but a continuous dialogue. For example, early prototypes of the workshop's openness were critiqued for potentially disrupting artisan workflow; subsequent iterations sought a balance between transparency and functional practicality. This reflective practice ensured the design remained a robust research instrument, with each iteration refining the project's argument about the mediating role of interior space.

In summary, this RtD methodology, through its structured yet adaptive stages, facilitated a deep exploration of the research question. The final design prototype for the Shanxi Lacquerware Studio is the synthesized output of this process, serving as a concrete proposal and a visual verbal argument for a specific approach to sustaining living heritage through intentional interior design.

4. Case Study: The Sustainable Lacquerware Studio

The outcome of the Research through Design process is a comprehensive design proposal for a Sustainable Lacquerware Studio in Yuncheng, Shanxi. This chapter details the design intervention as a synthesized response to the research question, focusing on

three integrated dimensions: a material strategy for circularity, a topological spatial strategy for engagement, and a zonal strategy for graduated participation.

4.1. Material Strategy: From Production Waste to Spatial Texture

A core innovation of the studio design is its "Scrap to Texture" material strategy, which directly addresses Sustainable Development Goal (SDG) 12.5 concerning waste reduction. The strategy transforms a linear production model into a circular one by upcycling lacquer production waste into primary interior finishes and retail products. The following table (Table 1) details the sources, forms, and applications of this upcycled material.

Table 1. Material Upcycling Strategy: From Waste to Resource.

Source of Waste (Production Stage)	Form of Waste	Upcycled Application in Studio	Sustainable & Narrative Value
Polishing & Finishing	Cured lacquer scraps (chips, flakes, dust)	Aggregate in custom terrazzo flooring & wall panels	Closes material loop; floor becomes a visual archive of the craft process, displaying layered cross sections.
Sanding & Shaping	Fine lacquer powder	Mixed with natural binders to form composite tiles or display plinths	Minimizes airborne waste; creates monolithic surfaces with a unique, speckled aesthetic.
Product Rejects / Damaged Pieces	Larger fragments of failed or old lacquerware	Reconfigured into contemporary jewelry & accessories (e.g., pendants, brooches) sold in the retail zone.	Gives "failed" objects a second life and economic value; makes heritage tangible and wearable.
Wood Substrate Preparation	Off cuts of wood (base material)	Used for display shelving, furniture elements, or decorative wall features.	Utilizes the full material palette of the craft; reinforces the connection between raw material and finished product.

This strategy ensures that sustainability is not an invisible technical specification but a visible, tactile, and aesthetic experience for the visitor. The terrazzo floor, embedded with lacquer chips, becomes a direct physical narrative of the craft's lifecycle.

4.2. Spatial Concept: Topological Fluidity and Visual Permeability

To counteract the formal, museum like atmosphere often associated with heritage displays, the studio employs a topological spatial layout. This approach creates a continuous, flowing interior where zones are defined by the curvature of walls and ceilings rather than abrupt partitions. The spatial organization is designed to guide movement and manage visual access according to the following logic (Table 2).

Table 2. Topological Spatial Strategy: Zone Definition and User Experience.

Zone Name	Spatial Characteristic (Topological Feature)	Primary Function	Intended User Experience & Psychological Effect
Entrance & Exhibition Zone	Gently curving, low height walls; warm, focused lighting.	Display of finished lacquerware;	Attraction & Orientation: A welcoming threshold that

		introduction to craft history & values.	piques curiosity and establishes cultural tone.
Transition & Circulation Path	A continuous, narrowing path defined by converging curved walls.	Guides movement from exhibition to deeper engagement zones.	Immersion & Guidance: The compressed path focuses attention and naturally draws visitors inward without signage.
Semi Open Maker's Space	Defined by a major curved wall with large, organic shaped apertures ("windows").	Active production area where artisans work.	Observation & Demystification: Allows passive observation of craft process, breaking down barriers between maker and viewer.
Hands on Experience Area	A semi enclosed "niche" or pocket off the main circulation.	Space for supervised public workshops (e.g., polishing accessories).	Participation & Empowerment: A safe space for active, tactile engagement, transforming visitors from observers to participants.
Retail & Hospitality Point	An open, centrally located area with flexible furniture.	Point of sale, consultation, and casual interaction.	Integration & Commerce: Blends commerce with social exchange, making purchase a natural conclusion to the visit.

This fluid layout eliminates harsh thresholds, creating a seamless journey from observation to participation. The large openings in the workshop wall are a critical design element, providing controlled transparency that invites curiosity while respecting the artisan's workspace (Table 3).

Table 3. Design of the Semi Open Partition: Functional and Experiential Parameters.

Aperture Design Parameter	Specification / Rationale	Functional Benefit	Experiential & Pedagogical Benefit
Shape	Derived from silhouettes of classic lacquerware vessels (e.g., hu, ding).	Creates structural variety and visual interest in the wall.	Subtly reinforces the cultural forms of the craft throughout the space.
Size & Number	Multiple apertures of varying sizes, positioned at different heights.	Allows for adequate ventilation and light into the workshop; frames different views of the work process.	Offers diverse vantage points (overview, detail view) of the craft, catering to different visitor interests.
Lower Sill Height	Approximately 1.1 meters from finished floor.	Provides a visual barrier that prevents casual intrusion into the workshop.	Encourages respectful observation from a slight distance, maintaining a sense of the workspace as active and professional.
Material	Framed in dark stained wood, matching other interior elements.	Provides a robust and clean finish that is easy to maintain.	Creates a "picture frame" effect, consciously presenting the craft activity as a living exhibit.

4.3. Integrated Experiential Program and Economic Model

The studio is conceived as a hybrid entity that integrates cultural transmission with a viable economic model. Its program is designed to create multiple value streams that support the artisans, the studio's operation, and the broader sustainability goals. The following table outlines this integrated model (Table 4).

Table 4. Integrated Program and Value Proposition of the Lacquerware Studio.

Program Component	Activity / Offer	Target Audience	Primary Value Generated (Cultural / Economic / Social)
Exhibition & Retail	Sale of traditional and upcycled contemporary lacquerware.	General mall visitors, collectors, design enthusiasts.	Economic: Direct sales revenue. Cultural: Promotes appreciation and understanding of lacquerware aesthetics and quality.
Active Production Workshop	Daily work of master artisans and apprentices.	Artisans, apprentices, observing public.	Cultural: Ensures the live practice and transmission of skills. Social: Provides dignified workspace and visibility for artisans.
Public Experience Workshops	Short, bookable sessions (e.g., "Polish Your Own Pendant").	Young adults, families, tourists, students.	Economic: Fee based activity income. Cultural/Social: Low barrier entry to craft; creates memorable, hands on connection with heritage.
"Scrap to Texture" Product Line	Design and sale of jewelry & objects made from production waste.	Fashion conscious consumers, sustainability advocates.	Economic: Creates value from waste stream. Environmental/Social: Tangibly demonstrates circular economy; sparks conversation about sustainable consumption.
Educational & Event Space	Hosting talks, school visits, or cultural events.	Local schools, community groups, cultural organizations.	Social/Cultural: Broadens community engagement; positions studio as a cultural hub within the commercial setting.

In conclusion, the Sustainable Lacquerware Studio design prototype materializes the theoretical framework into a coherent spatial, material, and programmatic intervention. By strategically upcycling waste, deploying a fluid spatial topology to guide and engage, and structuring a hybrid cultural economic program, the design demonstrates a replicable model for how interior environments can actively mediate the sustainability of living heritage crafts. The studio is not a passive container but an active agent in reconfiguring the relationships between artisan, material, process, and public.

5. Discussion

The design of the Shanxi Lacquerware Studio offers a concrete spatial argument for how interior design can actively mediate the sustainability of living heritage. This chapter discusses the key insights from the design prototype regarding desanctification, sustainable materiality, and spatial agency.

5.1. Desanctifying Heritage through Spatial Transparency

The studio design challenges the traditional museumization of intangible cultural heritage by integrating craft production into a contemporary commercial environment. The semi open spatial strategy, featuring large apertures in the workshop partition, is central to this approach. It enables "pedagogical transparency," allowing visitors to observe the artisans' labor and the craft process in real time. This visibility demystifies the skill involved, breaking down hierarchical distinctions between expert and public. The

dedicated hands on experience zone further deepens this engagement by enabling active participation. Together, these strategies work to replace passive reverence with experiential understanding, fostering a more accessible and personal connection to the heritage.

5.2. Materializing Sustainability as Cultural Narrative

The studio's "Scrap to Texture" strategy demonstrates that sustainability must be both operational and narrational. The upcycling of lacquer waste into architectural finishes and retail products closes a material loop in alignment with sustainable consumption goals. More significantly, it embeds sustainability into the aesthetic and cultural identity of the space. The terrazzo floor with lacquer aggregate becomes a visual archive of the craft, transforming waste into a unique design feature. This approach frames sustainable practice not as a technical add on but as a core source of cultural value and innovation, showing how circular material flows can enrich heritage expression.

5.3. The Interior as a Mediating Platform

This case positions interior design as a catalytic agent within heritage ecosystems. The studio is not a neutral container but an intentionally configured environment that choreographs interaction. Its topological layout guides visitor movement and manages sightlines to create a narrative journey from observation to participation. By combining workshop, gallery, classroom, and store functions, the space facilitates multiple forms of exchange: of knowledge, skill, and goods. This hybrid model suggests that the long term viability of a craft may depend on its ability to inhabit such multifunctional, dialogical spaces that simultaneously generate cultural meaning and economic support.

5.4. Limitations and Forward Pathways

As a design led prototype, this study highlights avenues for further research. The conceptual model requires empirical validation through real world implementation and post occupancy evaluation to assess its impact on engagement, economic viability, and artisan wellbeing. While the principles of material circularity, spatial transparency, and programmatic hybridity are transferable, their application must be adapted to specific cultural and economic contexts. The research process itself revealed the essential negotiations between design ideals and practical constraints, underscoring that designing for living heritage involves balancing respect for tradition with the demands of contemporary engagement.

6. Conclusion

This research has demonstrated that interior design can function as a vital mediating practice in sustaining living heritage. Through the Research through Design case study of the Shanxi Lacquerware Studio, the project articulates how spatial strategies can reconfigure relationships between traditional craft, contemporary society, and sustainable development.

The study proposes that sustainability in heritage contexts must be experientially grounded. The design prototype achieves this by replacing static display with a fluid, participatory environment and by transforming production waste into a visible spatial narrative. The "Scrap to Texture" material strategy and the topological, semi open layout work in concert to desanctify the craft, lower barriers to engagement, and embed circular economy principles into the cultural experience.

Ultimately, this project underscores the role of interior design as an active agent rather than a passive backdrop. By creating spaces that integrate exhibition, production, and hands on participation, design can help ensure that intangible cultural heritage remains a dynamic and viable part of our shared future. The studio model presented here

offers a replicable framework for supporting other heritage practices at the intersection of cultural continuity and sustainable innovation.

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