The Hybrid Artisan: Integrating AI-Powered Design Tools with Traditional Craftsmanship for Sustainable Creative Entrepreneurship

Ioana-Crina Pop-Cohuț *

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Article

The Hybrid Artisan: Integrating AI-Powered Design Tools with Traditional Craftsmanship for Sustainable Creative Entrepreneurship

Ioana-Crina Pop-Cohuț

Department of Economics and Business, Faculty of Economic Sciences, University of Oradea, 1 University Street, Oradea 410087, Romania; e-mail: ipop@uoradea.ro; ioanapopcohut@gmail.com

Abstract

As artificial intelligence (AI) technologies advance, traditional craftsmen face new challenges —to innovate using digital tools while preserving cultural authenticity and heritage knowledge. The "hybrid artisan," who strategically integrates AI-based design tools with traditional craft, emerges as a response to this tension. This article addresses research questions on how integrating generative AI technologies into design processes influences: (1) artisans' productivity and product quality; (2) cultural authenticity and heritage preservation; (3) sustainable business models in creative entrepreneurship. The research methodology employs a convergent design with mixed methods, combining: (a) a systematic literature review (PRISMA 2020, n=33 articles, 2022-2025); (b) a qualitative survey (n=13 artisans, Romania; semi-structured questionnaire, 34 items). The literature review identifies three dominant human-AI collaboration models: task-level cooperation, process-level coordination, and system-level co-creation. Diffusion models (LoRA-fine-tuned) and GANs achieve cultural authenticity scores of 73-95%, while reducing design time by 30-70%. Empirical data reveal paradoxes: artisans value authentic creativity and sustainability (30.8% rate sustainability as "extremely important"), but adopt AI cautiously (46.2% unfamiliar with AI tools). Those using AI report 15-40% productivity gains without proportional sales increases, suggesting the market does not yet equally value AI-assisted crafts. The successful "hybrid artisan" model relies on collaborative rather than autonomous AI positioning, explicit cultural safeguards in system design, and transparent communication with consumers about AI involvement. This research provides a framework for policymakers and entrepreneurs integrating digital technologies while maintaining cultural integrity.

Keywords: hybrid artisan; Human-AI collaboration; generative AI design; traditional craft; heritage preservation; sustainable creative entrepreneurship; human-in-the-loop; intangible cultural heritage

1. Introduction

1.1. Context and Significance

The fusion of traditional craft and artificial intelligence (AI) has emerged as a transformative force in creative entrepreneurship, giving rise to the "hybrid artisan"—a practitioner blending traditional techniques with AI-based tools. As AI technologies advance at unprecedented rates, traditional craft practices—characterized by long learning curves and low productivity—face existential threats from mass production [1,2], market pressures, and declining artisan populations. Digital tools can mitigate these challenges by enhancing rather than replacing traditional practices. Contemporary technologies offer opportunities for craft revitalization [3], innovation stimulation, and improved livelihoods through sustainable creative entrepreneurship [4]. In specific contexts like

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Chinese traditional embroidery [1] and jewelry design [5], AI applications show significant revitalization potential.

Digital technology integration in craft goes far beyond automation; it's described as an extension of the artisan's hand, not a denial of their mastery [European Craft Alliance, 2024]. The relationship between craft, technology, and design can be reciprocal and symbiotic, as the combination of the artisan's creativity, practicality, and digital design skills helps artisans create, study, and archive new designs [6]. Studies in textiles and fashion [7] and design process analysis [8] demonstrate that this synergy can generate significant innovations. In this context, the "hybrid artisan" concept outlines a creative practitioner who, alongside traditional skills, uses AI tools to reduce work time, stimulate creativity, support craft revitalization [9], and preserve cultural heritage through maintaining authentic qualities [10].

Recent developments in generative AI, particularly diffusion models and controllable generation systems, have created new possibilities for integrating computational creativity with artisanal knowledge, allowing artisans to experiment with new patterns, materials, and prototypes more efficiently. These technologies have been successfully tested in multiple contexts: from traditional embroidery [11], lacquerware [10], to intangible cultural heritage object design [12]. AI technology integration contributes to modernizing traditional crafts [12], enabling artisans to explore vast design spaces while maintaining cultural authenticity, reducing time-intensive manual processes, and accessing global markets via digital platforms [11]. Simultaneously, the sustainability imperative calls for new creative entrepreneurship models balancing innovation with craft preservation, efficiency with authenticity, and profitability with cultural integrity [13]. This synergy aligns with broader efforts to support local economies through creative entrepreneurship, where technology acts as a facilitator rather than a disruptor.

Thus, the "hybrid artisan" encompasses an emerging field extending beyond individual craft practices to include significant aspects of local, regional, national identity, cultural heritage preservation, knowledge management, technological equity, and sustainable development. Innovations in cultural ceramic products [14] and jewelry design [5] exemplify how heritage can be revitalized through AI. In local community contexts, integrating digital technologies with traditional practices can empower artisan groups, promote inclusive economic growth, while preserve cultural heritage. Likewise, the transition to Industry 5.0 emphasizes human-centered approaches positioning AI as a collaboration partner rather than a substitute for human creativity and skills [15]. However, integrating these technologies raises critical questions about authenticity, digital divide, digital literacy, adoption barriers, and viable business models [16].

1.2. Research Objectives

This article specifically focuses on integrating AI-based design tools with traditional crafts to foster sustainable creative entrepreneurship. Traditional crafts, within this paper's scope, encompass: textile arts (embroidery [1,17], weaving, dyeing [2,4,18]); jewelry and decorative arts (jewelry [19–22], porcelain [23,24]; lacquerware [10], paper cutting [25]), and related intangible cultural heritage practices [26,27]. The analysis emphasizes generative AI technologies (diffusion models, GAN networks, controllable generation) and their application in product design, pattern generation, and creative exploration. While the literature covers broader AI applications in production, this article's primary focus remains on design processes and creative collaboration among artisans, not automated manufacturing.

The main hypothesis of this research is that integrating AI into traditional craft enhances productivity, reduces material waste, and preserves cultural authenticity, thereby promoting sustainable creative entrepreneurship.

This study builds on prior work examining digital technologies' role in cultural heritage, extending it through quantifying AI's impact on artisanal workflows. Its importance lies in providing

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empirical evidence and a practical framework for artisans, policymakers, and entrepreneurs to adopt these without compromising authenticity and cultural integrity.

Recent literature highlights AI's potential in creative industries, particularly design innovation and sustainability. Yet gaps persist in understanding how traditional artisans adopt AI tools and their tangible effects on productivity and sustainability. Bibliometric analyses of AI positions in design processes [8] and case studies from Chinese traditional arts [28] provide context for these gaps. This study addresses them by analyzing practical AI applications in craft—from exploration and prototyping to marketing integration. The findings contribute to ongoing discussions about digital transformation in creative economies.

This study addresses one overarching research question, accompanied by three sub-questions that shed light on technological, cultural, and economic dimensions.

Main Research Question: How do AI-based design tools support sustainable creative entrepreneurship while preserving cultural heritage authenticity?

1.1: What AI architectures and design methodologies enable human-AI collaboration in traditional craft contexts?

1.2: How can AI systems be designed to enhance, rather than replace, artisans' creativity, and what mechanisms maintain cultural authenticity?

1.3: What business model innovations emerge when AI-assisted design enables large-scale production without compromising craft values?

The remainder of this paper proceeds as follows: Section 2 examines the relevant literature on the "hybrid artisan," AI integration in creative processes without diminishing authenticity, and creative entrepreneurship. Section 3 details the mixed-methods methodological approach, combining bibliometric analysis and survey. Findings in Section 4. Discussion about implications for sustainable business models and cultural sustainability, in Section 5. Finally, Section 6 addresses limitations, while Section 7 offers conclusions and recommendations for future research and interventions.

2. Theoretical Framework

2.1.". Hybrid Artisan" - Conceptual Foundations

The theoretical foundation for understanding the "hybrid artisan" paradigm draws from multiple disciplinary perspectives, creating a rich conceptual framework integrating technological, cultural, economic, and creative dimensions. We explain the "hybrid artisan" concept through the lens of human-AI collaboration theory (how systems are designed), cultural heritage preservation and knowledge transfer theory (what cultural values we protect), and sustainable entrepreneurship theory highlighting economic viability (business models that work). The hybrid artisan emerges at the intersection of all three layers. These three theoretical perspectives are not separate but interconnected (Figure 1).

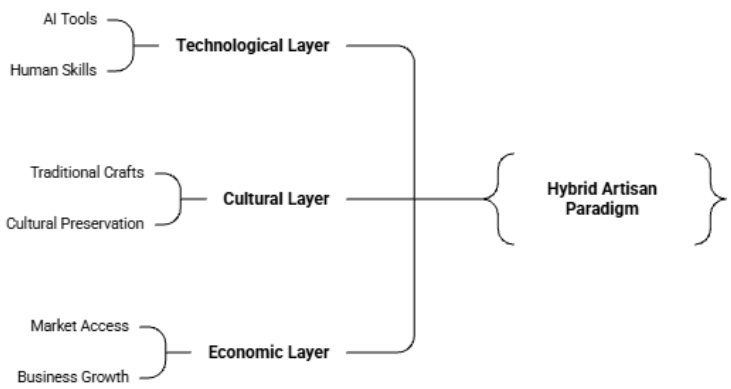

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Figure 1. Hybrid artisan paradigm. Source: Author elaboration.

Human-AI Collaboration Theory: At the heart of the hybrid artisan concept lies the "Human-in-the-Loop" principle for AI systems, where artificial intelligence serves as a collaborative partner rather than an autonomous agent. Zhang M. et al. (2023) [29], propose a three-level framework for effective human-AI collaboration in creative processes: task-level cooperation (specific design operations: human creates, AI assists testing), process-level coordination (workflow integration: human and AI communicate to build and test creative outcomes), and system-level co-creation (process autonomation: AI participates in most stages based on human-provided requirements). In this framework, artisans act as creative directors guiding AI systems [30]. For instance, artisans create sketches or reference compositions that AI then elaborates with intricate details [10], or the artisan trains the algorithm with their own sketch sets [31]. The implications of this partnership model on identity are explored in depth in artistic co-creation literature [31], while fashion design applications [7] demonstrate viability in complex creative contexts.

Cultural Heritage Preservation creative and Knowledge Transfer Theory: Integrating AI with traditional craft must be understood within cultural heritage preservation frameworks. Here, hybrid artisans must consider both cultural roles and technical functionality, distinguishing between classical documentation/interpretation models and generative techniques for replicating traditional patterns [32–34]. This perspective emphasizes that effective AI systems must go beyond mere digitization to support co-creative production, participatory design, and inclusive governance respecting indigenous knowledge systems [27]. Likewise, the hybrid artisanal paradigm involves complex creation, encoding, and knowledge transfer processes. Wang et al. (2025) [30], demonstrate how AI systems can facilitate knowledge management within cultural heritage systems [12], enabling artisanal knowledge documentation, transformation into digital representations, and transmission to new generations. This process involves, on one hand, digitizing knowledge (patterns, techniques, aesthetic principles) and, on the other, human practice (material sensitivity, contextual judgment, cultural meaning creation).

Sustainable Entrepreneurship Theory: The economic dimension of the hybrid artisanal paradigm aligns with sustainable entrepreneurship principles balancing economic viability with social and environmental responsibility. The literature reveals business models using AI to reduce costs and production time while increasing design quality and market access, maintaining commitments to fair compensation, community responsibility, and cultural integrity [4]. For example, artisanal industries in marginalized rural communities can be developed through innovative AI techniques generating more marketable contemporary patterns for artisanal articles [35].

2.2. AI Integration and Hybrid Artisanal Paradigm

Literature on AI integration in design reveals significant approach differences. To understand how AI integrates into creative practice, Hwang et al. (2025) conducted a bibliometric analysis of 126 papers mapping AI use across design process stages: research, ideation, prototyping, production, and evaluation. Their findings show AI predominantly discussed in later stages, especially production (68% mentions), while ideation stages show lower usage (18% mentions). Early stages (ideation, conceptualization, material exploration) are where human creativity and cultural context matter most.

This research intentionally focuses on design integration in early stages (documentation, idea generation), where AI enhances creative capacity rather than replacing it. This positioning aligns with Industry 5.0 paradigm [15], prioritizing human creativity alongside technological efficiency.

Unlike prior works presenting theoretical frameworks or case studies without featuring artisans' perspectives themselves—despite their centrality in the hybrid artisanal model—our approach examines their interactions in real contexts. Results not only validate AI integration benefits but identify practical challenges and opportunities for stakeholders. We offer a more nuanced

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understanding of how AI can support sustainable creative entrepreneurship without compromising cultural integrity.

2.3. Significance and Impact

This research contributes to three Sustainable Development Goals [36]: (1) SDG 5 (Gender Equality): 84.6% of surveyed artisans are women; AI integration impacts incomes and autonomy. (2) SDG 8 (Decent Work): Addresses decent work in creative entrepreneurship, including income stability and working conditions. (3) SDG 12 (Responsible Consumption): Examines how AI enables sustainable material practices. Additionally, this research intervenes at a critical policy moment: EU regulatory frameworks [37] and UNESCO Recommendation on International Cultural Heritage [38] create need for evidence-based guidance on technology adoption in heritage sectors.

3. Methodology

3.1. Overview of Convergent Mixed Methods Design

This research uses a parallel convergent mixed methods design [39,40], comprising two independent investigations conducted separately—quantitative bibliometric analysis (Systematic Literature Review, SLR) and qualitative artisan survey (semi-structured questionnaire, purposeful sampling with informational power as adequacy criterion, not statistical generalizability)—then integrated at the interpretation stage for triangulation (Figure 2). We consider this design appropriate because: no single method fully captures the phenomenon (literature analysis reveals global evidence; artisan survey provides local grounding); convergence/divergence between findings clarifies identified aspects; mixed methods reduce single-method error. Integration occurs in Section 5, Discussions, where quantitative models (e.g., 73% authenticity scores from literature) are compared with qualitative findings (e.g., 1 of 13 artisans expresses authenticity loss concerns).

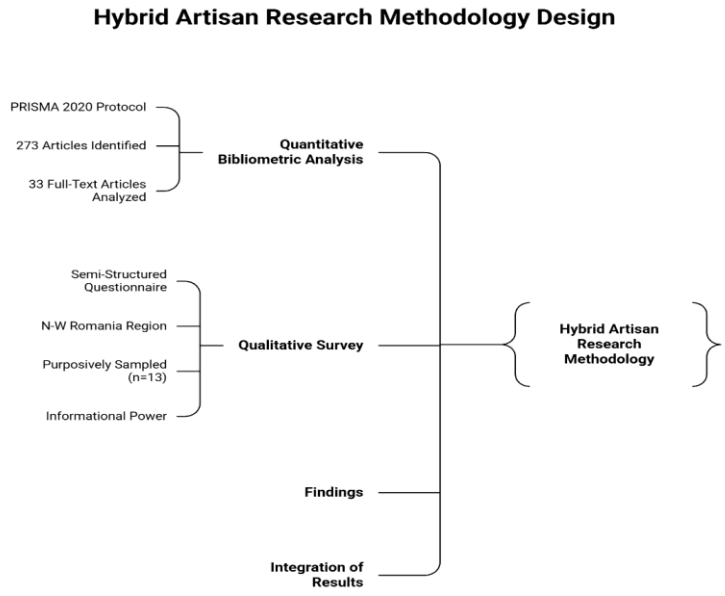

Figure 2. "Hybrid artisan" Research Methodology Design. Source: Author elaboration.

3.2. Research Stages

3.2.1. Quantitative Research

The quantitative research, systematic literature review guided by PRISMA 2020 principles [41,42], involved: establishing search terms, database investigation, preparing the identified works database, setting inclusion/exclusion criteria, finalizing the list of scientific articles best addressing

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research objectives. Databases and search engines were prioritized by relevance to the field: Scopus, Web of Science, ScienceDirect, Arxiv, SpringerLink, and Google Scholar.

Search Terms Establishment. We established the search strategy starting from keywords fitting the research objective, using keyword combinations divided into four thematic groups: AI Technologies: artificial intelligence, machine learning, generative AI, etc., applicable to craft and manual arts; Design and Creativity: design tools, creative process, pattern generation, computational creativity; Traditional Crafts: traditional crafts, artisanal, crafts, intangible cultural heritage, textile arts, embroidery, other crafts; Sustainable Creative Entrepreneurship: creative entrepreneurship, sustainable entrepreneurship, cultural preservation, artisanal economic viability. Concept combinations used Boolean operators (AND, OR) with wildcard truncation. Thus, search queries combined terms like ("hybrid artisan" OR "machine learning") AND ("traditional craft" OR "manual craft") AND ("sustainability" OR "cultural preservation"); ("creative entrepreneurship" AND "Generative AI design"); ("hybrid artisan" AND "creative entrepreneurship") AND ("Generative AI design" and "craftmanship"); etc.

Database Preparation and Standardization. We extracted 273 articles from Scopus, Web of Science, ScienceDirect, Arxiv, SpringerLink, and Google Scholar. Records were exported in RIS or BibTeX format and imported into bibliometric analysis software Bibliometrix R, Biblioshiny [43], RStudio version 4.4.3 (2025-02-28 ucrt), with duplicates checked.

Inclusion and Exclusion Criteria Establishment. Inclusion criteria were: books, book chapters, peer-reviewed journals, open access articles, conference papers, articles presenting key contributions: results, innovations, perspectives; theoretical and practical implications; presenting research methods, AI technologies used, frameworks applied to traditional artisanal practices; application domain and cultural context linked to craft traditions; research examining human-AI collaboration in creative contexts; works addressing cultural heritage preservation via digital technologies; studies on sustainable entrepreneurship models in creative industries; empirical evidence, case studies, or theoretical frameworks for AI integration in craft. Exclusion criteria were: Studies solely on industrial automation without artisanal dimensions (45 articles excluded); AI research in creative fields (music, literature, film) without material artisanal connection (53 excluded); Technical AI development papers without application context (52 excluded); Digital fabrication research (3D printing, CNC) without AI or design tool components (38 excluded); non-English publications (52 excluded). Exclusion criteria based on distinction between AI in production vs. design, similar to classification in Hwang et al. 2025 bibliometric meta-analysis. Figure 3 shows analysis stages following PRISMA-2020 model.

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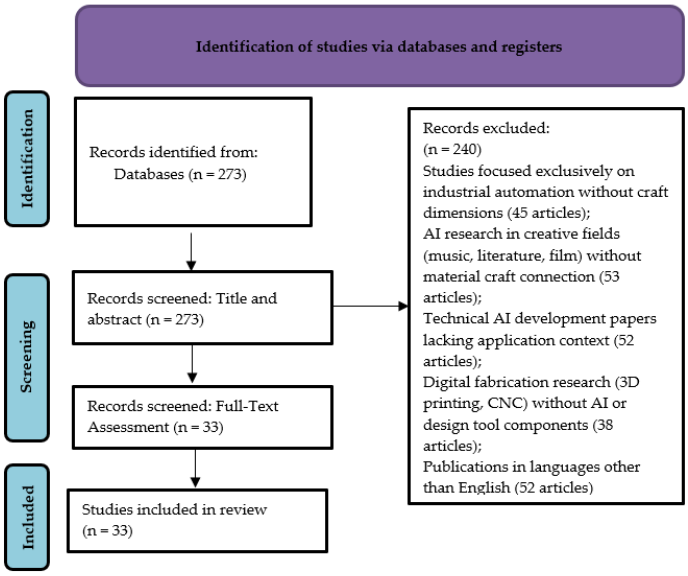

Figure 3. PRISMA 2020 flow chart for selection of articles for "Hybrid artisan".

Screening occurred in two stages: title/abstract screening for all 273 titles/abstracts per inclusion criteria; full-text evaluation for 33 potentially eligible articles. Included articles evaluated on: methodological rigor (1-5 scale: Is study design adequate? Sample size justified? Methods clearly described?); relevance to research questions (1-5: Does study directly address human-AI collaboration, cultural authenticity, or business models?); evidence strength (Scale: Level 1=Meta-analysis/SLR; Level 2=RCT/Comparative; Level 3=Quasi-experimental; Level 4=Observational/Qualitative; Level 5=Expert opinion); Distribution of included studies by evidence level: Level 2-3 (Comparative, quasi-experimental): 36.36% (n=12); Level 4 (Observational, qualitative, case studies): 54.54% (n=18); Level 5 (Expert analysis): 9.1% (n=3). The 33 selected articles are presented in Appendix A, Table A. "Hybrid Artisan" – selected articles.

3.2.2. Qualitative Research

The qualitative component involved an electronic questionnaire (Google Forms) with semi-open structure, containing 34 items organized into five main thematic sections.

Questionnaire Design. The questionnaire addressed four research dimensions: artisan characteristics and experience; success definition and entrepreneurial motivations; AI tool perceptions and usage; sustainability values and practices. It included closed-response items (Likert scales, multiple choice), semi-open items (options with comment possibility), and fully open items allowing narrative responses (Table 1).

Table 1. "Hybrid artisan" Questionnaire structure and sample items[1].

Section	Items	Format	Sample Items	Rationale
A. Demographics & Background	6	Categorical + open	Age, craft domain, years' experience, business model status	Establish participant profile
B. Success Definition & Entrepreneurial Motivation	8	Likert (1-5) + ranking	"Rank in priority: income growth / creative fulfillment / work-life balance / cultural transmission"	Assess whether artisans view success

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				economically or culturally
C. AI Familiarity & Usage	9	Categorical + Likert	"How familiar are you with AI tools? (Not at all / Heard of it / Used once or twice / Use regularly)"; "Which tools have you used? (Canva AI / DALL-E / ChatGPT / Rhino / CAD / Other)"	Map current adoption landscape
D. Perceived Benefits & Barriers	6	Likert + open	"To what extent has AI improved your design process? (1=Not at all ... 5=Dramatically)"; "What concerns do you have about using AI in your craft? (open)"	Capture perceived value and concerns (authenticity, cost, learning curve)
E. Sustainability Practices & Values	5	Likert + multiple choice	"How important is sustainability to your business? (1-5)"; "What sustainable practices do you implement?" (minimize waste / use recycled materials / reduce energy / eco-packaging / other)	Assess whether AI adoption correlates with sustainability commitment

[1] Source: Author elaboration.

Sampling and Recruitment Strategy

We used maximum variation purposeful sampling [44] of Romanian artisans. Recruitment considered three dimensions to capture perspectives of interest: craft domain diversity (textiles/embroidery—dominant local tradition, jewelry—emerging contemporary crafts, decorative arts—heritage-focused); business model/status diversity (craft as main livelihood, secondary, alongside other activities—hobby/passion); experience and innovation readiness. This strategy ensures capturing both conservative perspectives (long-experienced craftsmen valuing tradition) and innovation-oriented ones (newer practitioners open to technology). For sampling frame preparation, we investigated online craft marketplaces, collaborative platforms promoting artisans, national contest presentation platforms, searched artisan profiles, etc., creating a public contacts database. Identified 31 artisans whose profiles and online presence matched research objectives. Sent emails and contact forms presenting research purpose with questionnaire link, obtaining 13 responses (41.94% response rate) from NW Romania artisans, identified by residence county. Recruitment occurred September 2025–January 2026 (4-month period capturing seasonal craft activity patterns).

Sample Characteristics (n=13). Final sample includes 13 artisans with varied profiles (Table 2) but relatively homogeneous regarding craft domains and geographic context. Sample shows high homogeneity [45] on geographic axis (92.3% urban), 84.6% women, craft domains (62% textiles/embroidery; 54% jewelry), cultural contextualization (Romania, NW region, same language, similar cultural norms).

Table 2. Respondents' Characteristics[2].

Characteristic	Distribution	Methodological Implications
Age	26-62 years (median ~50)	Generational diversity; mix traditional/modern perspectives

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Gender	11F/2M (84.6% women)	Reflects artisanal demographics reality
Residence Environment	12 urban / 1 rural	Technology and online market access; urban bias mitigated by 1 rural artisan
Experience	1-15+ years (uniform distribution)	No predominant "novice" or "expert" effect
Entrepreneurial Status	38.5% main / 46.2% secondary / 15.4% hobby	Intentional heterogeneity for perspective capture

[2] Source: Author elaboration.

According methodological literature, for relatively homogeneous qualitative studies using deliberate sampling, our n=13 meets adequacy threshold [46] for data saturation. Sample fits "information power" concept [47], as adequacy determined by: study purpose: relatively narrow and well-defined—exploring artisan AI integration in traditional creative practices for sustainability; sample specificity: specific (creative artisans, not clients or other stakeholders); dialogue quality: questionnaire responses often detailed/narrative; some provide directly valuable quotes; analysis strategy: niche thematic analysis without statistical generalization claim.

Saturation thematic analysis shows: "authenticity vs. AI" theme saturated (appears in 5-6 responses); "AI benefits (time saving)" saturated (4 responses); "AI ambivalence" saturated (6 responses); "sustainability" saturated (10 responses). Thus, we consider our sample, though small quantitatively, sufficiently informative for rigorous qualitative analysis.

4. Results

The results bring together two major data sources: the systematic literature reviews (SLR) and the qualitative survey carried out among local artisans, providing an integrated picture of how AI is used in crafts, what kinds of human–AI collaboration are taking shape, and how the impacts are perceived on authenticity, productivity, and sustainability.

4.1. SLR Results: AI Technologies and Human–AI Collaboration Models

Analysis of the 33 studies included in the SLR shows that the technological landscape is dominated by two families of architectures: diffusion models and adversarial generative networks (GAN), often combined in hybrid approaches. Diffusion models with LoRA fine-tuning have been successfully applied in multiple heritage contexts: Chinese traditional ceramics [23,24], teacup design [48], and revitalization of traditional kite design [3]. Conditionally trained GANs have been implemented across multiple textile traditions: Punjabi embroidery [4], Miao embroidery [11], and traditional printing on textiles [1 Diffusion models are preferred in applications that require fine control and high visual quality (embroidery, lacquering, cultural object design), while GANs remain very useful in contexts with limited datasets, especially in textiles and patterns. In parallel, the literature documents domain-specialized systems—textiles and embroidery, decorative arts (lacquering, paper cutting, braiding)—which adapt these architectures to specific material, composition, and symbolism constraints.

At the human–AI relationship level, the studies converge toward a paradigm shift: AI is no longer seen as an autonomous creative agent, but as a collaborative partner in human-led design processes. The three-level framework proposed by Zhang et al. (2023)—cooperation at task level, coordination at process level, co-creation at system level—is illustrated by numerous applications, in which artisans remain "creative directors," while AI handles exploration and execution of variants. Human-in-the-loop models dominate: the artisan provides sketches, stylistic preferences, and cultural constraints, while the AI system generates, the artisan filtering and refining through iterative feedback. The literature also shows that these systems can extend abilities, not just reduce the "qualification threshold": artisans redistribute their effort from repetitive tasks (routine drawing) toward strategic decisions on composition and work stage.

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Performance evaluation in studies is multidimensional. Technical metrics [12,24,48] show that AI design systems achieve high standards of visual quality and result stability. At the same time, many studies incorporate expert evaluation—groups of artisans or curators scoring authenticity and quality—and practical metrics such as design time reduction, productivity increase, and improved profit margins in cooperatives adopting AI. This mix of technical, cultural, and economic indicators supports the idea that success in AI-for-crafts cannot be assessed only by accuracy or visual realism, but also by cultural adequacy and socio-economic impact.

4.2. SLR Results: Cultural Authenticity and Heritage Preservation

The analyzed studies show that a central tension in AI-assisted craft practice is the balance between authenticity and innovation. Works like those by Jyoti & Singh (2025) [4] or Liang et al. (2025) [10] use expert panels to evaluate to what extent generated models respect traditional principles of symmetry, color palettes, and motif vocabulary, reporting perceived cultural authenticity rates between 73% and 95% for AI designs considered "culturally acceptable" [1,14,49]. Other studies highlight that AI can support restoration and reinterpretation of heritage—from ancient painting to regional embroidery—provided datasets and evaluation criteria are built together with legitimate tradition holders.

At the same time, the literature recognizes the creative role of "algorithmic surprise": AI can generate unexpected combinations that expand artisans' creative horizons, but validation of these results remains fundamentally human [7,30]. For this reason, many proposed frameworks emphasize institutional mechanisms—heritage councils, community committees—to guide AI use, to avoid both rigidifying tradition and diluting it into a "stylized folklore" without cultural anchor.

4.3. SLR Results: Business Models and Sustainability

Integrating AI with traditional craft generates substantial productivity gains: reduction in manual drawing time, shortening of design and prototyping cycles, and increased capacity to serve customized orders [3,10]. These benefits are reflected in revenue growth and the ability to experiment with personalization at scale, combining artisanal uniqueness with digital production efficiency. In parallel, business models emerge that blend cooperative ownership, fair trade, and responsible AI use, so artisanal communities retain control over tools and generated benefits.

The environmental dimension is still relatively underexplored, though some studies track AI systems' carbon footprint and test AI for process optimization (e.g., in dyeing, to reduce chemical consumption and waste). Overall, the literature suggests AI can support sustainable creative entrepreneurship models—economic, social, and cultural—but full integration of ecological criteria into system design and business models is still incipient [23,24].

4.4. Empirical Results: Local "Hybrid Artisan" Profile

Questionnaire data outline a population of artisans in transition between a traditional model (craft as passion and cultural vocation) and an entrepreneurial one. 46.2% of respondents describe artisanal activity as secondary, and defining "success" privileges creative fulfillment and work-life balance over profit maximization; only a minority ranks turnover at the top of success criteria. Central motivations for continuing activity are passion for the process, autonomy, and desire to preserve and pass on a tradition, indicating that AI integration is evaluated mainly through its impact on identity and work meaning, not just as an economic tool.

Regarding AI adoption, results show strong fragmentation: 46.2% of respondents are not at all familiar with AI, 23.1% have heard but not used, 23.1% have used occasionally, and only 7.7% use such tools regularly. Reported uses cluster around accessible applications (Canva AI, CAD tools, laser-cutting, occasionally DALL-E or other generative tools), mainly in design exploration phases, prototyping, and promotional materials, not in the core object creation process. Perceived benefits include time savings in design, expanded creative possibilities, and marketing facilitation, but only

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two respondents mention clear sales increases, suggesting the market does not yet explicitly reward AI use in craft.

Concerns about authenticity are pronounced: several respondents find it difficult to maintain "artisanal authenticity" when AI intervenes, and only a minority explicitly communicates AI's role in design to customers. For many, AI use is acceptable in "peripheral" areas (communication, layout, visual materials), but problematic when it directly affects the final object's form and texture. Regarding sustainability, respondents declare it important or very important in high proportions, but implemented practices are mainly limited to material waste minimization and, more rarely, use of recycled materials or eco-packaging; dimensions like energy or product lifecycle are nearly absent.

4.5. Paradoxes Between Literature and Practice

Comparing SLR results with empirical data highlights three paradoxes. Adoption paradox: while literature documents numerous successful projects and clear AI benefits in crafts, most local artisans are either unfamiliar or use AI only marginally, suggesting a significant gap between academic-technological innovation and practical adoption. Authenticity paradox: studies report high cultural authenticity evaluations for expert-supervised AI designs, while a significant portion of artisans perceive risks of losing "handmade" authenticity and avoid communicating AI involvement to customers. Sustainability paradox: literature emphasizes AI's potential to reduce waste and optimize processes, but in practice, artisans—though declaratively sustainability-oriented—implement only gradually changes, without systematically leveraging AI for ecological goals.

These paradoxes provide a useful framework for further discussion of the "hybrid artisan," showing that differences between models and reality stem not only from technology availability, but also from professional narratives, risk perceptions, and lack of adequate support infrastructures for critical and creative AI adoption in crafts.

5. Discussions

5.1. Key Finding 1: Human–AI Collaboration Works (When Well Designed)

The hybrid artisanal model presents a compelling argument for reimagining creative entrepreneurship in the digital era. This study's results have implications for both theory and practice, particularly in the ever-evolving landscape of creative entrepreneurship, and show that leveraging AI as a tool for cultural continuity, rather than disruption, represents a viable approach through which societies can support artisans in their role as guardians and transmitters of traditional craft in an increasingly technologized world [26,27]. The "hybrid artisan" model demonstrates that AI can serve as a catalyst for sustainable innovation while preserving cultural authenticity—a dual achievement that challenges conventional dichotomies between tradition and modernity [1,4,25,26].

A central finding identified through the SLR is that effective AI integration into artisans' work is essentially complementary: it leverages the strengths of human and artificial intelligence rather than attempting to replace human capacities with AI. The complex way artisans create, understand cultural context, evaluate aesthetics, and steer creative direction can be complemented by AI-based technologies, which excel in pattern exploration, rapid variant generation, and computational optimization [7,13,49]. The most successful systems, like those described by Liang et al. (2025) [10] and Jyoti & Singh (2025) [4], position artisans as creative directors providing high-level guidance, while AI handles execution, supporting a future of crafts based on augmentation, not automation [5,20]. Applied studies in jewelry design [5], fashion design [7], and combinatorial creative design [30] validate that collaboration models work when implemented with attention to domain specifics.

Empirical data confirm these creative possibilities extension but also show benefits tempered by authenticity loss concerns, with AI adoption in design remaining very limited [31,50]. Local artisans' responses suggest a staged adoption progression: AI tools first used for initial tasks (exploration and inspiration, pattern generation) and only rarely integrated into full workflows; in all cases, respondents emphasize the need for human oversight to ensure cultural fidelity, especially when AI

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suggestions deviate from traditional norms. Our results on familiarity and use of AI tools among local artisans (46.2% state they are not at all familiar with AI, and only 7.7% report regular use) must be understood against the broader European landscape described in the "Understanding the New Technological Context for Craftsmanship" study [6]. Although the study shows a relatively high level of integration of digital design and fabrication technologies (69.7% of respondents already use CAD, 3D printing, CNC or similar technologies), about 30.3% of surveyed artisans state they have not integrated such technologies at all [6]., often citing similar reasons to those identified in our research: lack of concrete opportunities, perceived complexity, learning costs, and the feeling that, with technology, the product "is no longer truly craft" [6].

5.2. Key Finding 2: Cultural Authenticity Can Be Preserved (But Not Automatically)

The literature shows that cultural context is a central, not peripheral, element in designing AI systems for crafts and must not be addressed only after technical development, but guide system architecture from the start [1,26,27,49]. Systems explicitly encoding cultural constraints [4], involving communities in participatory design [51], and implementing cultural governance mechanisms have greater success in maintaining authenticity while allowing innovation [23,24]. These finding questions "technology-driven" approaches that develop AI systems first and then try adapting them to cultural contexts, suggesting instead that cultural understanding must inform technical and interaction design from the outset.

Empirical results support this view: artisans experimenting with AI tools insist on their role as "authenticity guardians," using AI especially for stylistic variations and quick visualizations, but reserving final decisions on form, color, and symbols for human judgment. Fears like "loss of emotional layers," "distortion of traditional meanings," or "stylistic uniformization" appear frequently in responses, indicating AI acceptance is conditioned on clear mechanisms allowing artisans to validate, adjust, or reject algorithm results [19,22,50]. Thus, preserving authenticity is not an automatic effect of AI use, but the result of careful socio-technical design recognizing the centrality of practice communities and tacit knowledge in defining what is "authentic."

5.3. Key Finding 3: Economic Viability Exists (But Requires Redefining "Success")

A significant SLR finding is that economic viability and cultural integrity can mutually reinforce each other. Analyzed case studies show AI integration can lead to productivity increases, improved profit margins, and design quality enhancement without eroding authenticity—for example, productivity metrics indicate over 30% average design output increase for AI-adopting artisans due to shortened iteration cycles [4,18,23,49]. Examples like papier-mâché artists or Kashmir shawl producers completing complex patterns up to 40% faster through AI-assisted mockups illustrate how generative tools can free time for high value-added activities while keeping traditional techniques central [25,52].

Local empirical data indicate more modest and diffuse benefits however: surveyed artisans report design time savings, commercialization and marketing simplifications, and market expansion through AI-supported digital platforms, but only moderate sales and revenue increases. This suggests that for artisans, "success" is not defined exclusively in economic terms, but includes criteria related to authenticity, creative satisfaction, and community contribution; the strong emphasis on cultural sustainability and well-being redirects sustainable entrepreneurship discussion from profit maximization toward balancing income, meaning, and cultural continuity. The hybrid artisan paradigm thus enriches sustainable entrepreneurship theory, suggesting relevant business models in this sector should be evaluated not only through financial indicators, but also cultural sustainability and social equity indicators [53,54].

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5.4. Paradox: Why Adoption Lags Behind Demonstrated Benefits

Comparing literature with empirical data reveals a strong paradox: at case study and prototype level, AI in crafts is presented as technical and economic success—with culturally validated designs, productivity gains, and new market opportunities—while at everyday practice level, adoption remains low, fragmented, and marked by ambivalence [1,18,23,49,52]. In this research, few artisans use AI consistently, and those who do place it more at the creative process periphery (exploration, marketing) than production core; similarly, literature reports persistent reticence about control loss, product depersonalization, and technology-identity misalignment [50,54].

This gap can be interpreted as effect of multiple barrier types: competency (lack of time and resources to learn new tools), infrastructural (limited access to advanced hardware/software), but also symbolic and narrative [50,54]. For many practitioners, technology associates with mass production and industrial logic, while craft defines through direct material contact, slow rhythm, and object uniqueness. Absent discursive and institutional frameworks that recognize AI as legitimate craft tool, even success examples remain peripheral. The "demonstrated benefits—delayed adoption" paradox suggests future policies and interventions must focus not only on technology transfer, but also negotiating these narratives and co-building AI usage models perceived as authentic and acceptable within artisanal communities.

5.5. Implications for Stakeholders

The "hybrid artisan" paradigm generates distinct practical implications for artisans, technology developers, policymakers, and cultural institutions. For artisans, results suggest AI most useful when integrated gradually and selectively, in tasks not eroding manual practice core (form exploration, motif variations, digital prototyping, marketing support), while maintaining creative control and veto right over generated results [1,4,25]. Artisans can use AI as emancipation tool—to reduce repetitive burdens, test more variants quickly, access distant markets—provided they retain author and curator position of their products [26,52].

For developers, research indicates AI systems for crafts must be designed starting from deep cultural context understanding and co-design processes with artisanal communities [3,13,20]. Requirements like explainability, controllability, and ability to incorporate explicit cultural rules and constraints become as important as technical performance; most successful systems are "human-in-the-loop," allowing artisans to guide, correct, and personalize AI results, not those attempting full creative process automation [20,26]. For policymakers, results support need for policies recognizing AI in crafts as public good: investments in digital heritage documentation, training and shared infrastructures (workshops, labs), and development of certification standards distinguishing AI-assisted artisanal products from industrial imitations [15,53,54].

Finally, cultural institutions—museums, heritage organizations, creation centers—can play essential role in facilitating hybrid artisan transition [26,27]. They can offer safe experimentation spaces, connect artisans with technical experts, support knowledge documentation and transmission, and oversee cultural adequacy of digitization projects. Shifting from passive preservation logic to active support for living traditions, including responsible AI exploration, thus appears as necessary step to ensure digital transformation strengthens—and does not dilute—crafts' role in contemporary cultural and economic ecosystems [27,55].

6. Limitations

This analysis reveals several limitations in the current research and gaps requiring future attention. First, we acknowledge methodological limitations. Although the bibliometric analysis followed PRISMA 2020 guidelines, its focus on English-language publications may have overlooked relevant perspectives on AI integration in crafts. Longitudinal evidence is limited; most studies report short-term results from pilot projects or initial implementations. Longitudinal evidence examining sustained impact on artisans' livelihoods, community dynamics, knowledge transmission, and

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cultural evolution is largely absent. This limitation makes it difficult to assess initial benefits, unintended long-term consequences, how human-AI collaboration evolves as artisans gain experience. The field needs long-term studies tracking AI-craft integration.

The SLR also reveals geographic and cultural concentration, heavily focused on East Asia, with limited representation from other regions. This geographic concentration may reflect research capacity, policy priorities, or publication patterns, but limits understanding of how AI-craft integration works in diverse cultural contexts. Although we tried to compensate this aspect by examining local artisans (Romania, Eastern Europe), research from as many and diverse communities as possible is imperative. This gap limits the field's ability to develop culturally adaptable approaches and understand context-specific factors.

Although several studies report economic impacts (productivity gains, profit improvements), comprehensive economic analysis is limited. Most often the "hybrid artisan" adopts a narrow entrepreneurial model based on self-employment, solopreneur, where intrinsic motivations relate to economic independence but especially creative independence. In this context, aspects like market dynamics, competitive effects, long-term economic sustainability, distributive impact, and macroeconomic effects remain largely unaddressed. The field needs more sophisticated economic analysis examining not only immediate impact, but long-term sustainability and broader economic implications.

While economic and cultural sustainability receive increased attention, environmental dimensions are underexplored. Few studies examine AI systems' environmental impact (energy consumption, carbon footprint, e-waste) or how AI-craft integration affects material sustainability, waste reduction, or environmental practices in craft production. Given environmental sustainability's importance for long-term viability, this gap requires attention.

7. Conclusions

This comprehensive literature analysis examined the emerging "hybrid artisan" paradigm—creative artisan integrating AI-based design tools with traditional craft to achieve sustainable creative entrepreneurship. Empirical research was conducted using mixed data collection methodology, systematic literature review (33 studies) and qualitative empirical research (13 artisans). Main conclusions are: AI-craft integration is technically feasible at high quality; successful integration requires intentional human-AI collaboration design; authenticity not automatic—must be designed and validated; adoption lags behind demonstrated benefits; artisans define success culturally, not economically.

This study demonstrated that AI integration into traditional crafts encourages sustainable creative entrepreneurship while preserving cultural authenticity.

The "hybrid artisan" paradigm represents an emerging model for how traditional knowledge and contemporary technology can be integrated to achieve sustainable creative entrepreneurship. Evidence shows this integration not only possible, but can offer tangible benefits regarding productivity, profitability, authenticity, and cultural preservation. Technical capabilities have advanced sufficiently to enable efficient craft applications, and early implementations demonstrate promising results. However, scaling these successes while maintaining cultural integrity, ensuring community benefits, and avoiding appropriation or exploitation requires particular attention to governance, ethics, and power dynamics. Integrating new technologies into craft must be guided by cultural context understanding, place community at center, alongside developing educational, economic, and cultural policies protecting cultural heritage, authenticity, while allowing innovation.

Future research should explore longitudinal effects of AI adoption on skills transmission between generations; particularly how digital tools influence intergenerational learning dynamics in craft communities. Cultural receptivity of AI-assisted products also warrants deeper investigation, as consumer perceptions of authenticity can shape market trajectories. Additionally, comparative studies between diverse craft typologies could reveal how cultural contexts mediate AI integration

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strategy effectiveness. These researches would lead to better understanding of sustainable innovation in traditional crafts, ensuring technological progress serves as bridge, rather than barrier, to cultural preservation.

Thus, the "hybrid artisan" paradigm offers a vision of technological progress that enhances, rather than replaces, human creativity, preserves, rather than erases, cultural heritage, and empowers, rather than replaces, traditional artisans. Realizing this vision requires commitment to human-centered technology development, cultural respect, economic equity, and sustainable practices.

Abbreviations

The following abbreviations are used in this manuscript:

AI	Artificial Intelligence
SLR	Systematic Literature Review
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
GAN	generative adversarial network
LoRA	Low-Rank Adaptation

Appendix A

Table A1. "Hybrid Artisan" – selected articles.

No.	Category	Authors	Title	Publication and Identifiers	Methods	Findings and Relevance
1.	Cultural Heritage Preservation & Digitization	Zhang, B., Cheng, P., Deng, L., Romainoor, N.H., Han, J., Luo, G., Gao, T.	Can AI-generated art stimulate the sustainability of intangible cultural heritage? A quantitative research on cultural and creative products of New Year Prints generated by AI	Heliyon, Vol. 9, Issue 10 (2023), October 2023; DOI: 10.1016/j.heliyon.2023.e20477	Quantitative survey (n=291 participants, Tianjin, China); AISAS model framework; path analysis incorporating perceived value theory	Attraction to AI products, perceived value, cultural identity, ICH sustainability. Empirical evidence that AI-assisted products promote intangible cultural heritage sustainability.
2.	Cultural Heritage Preservation & Digitization	Shi, Y., Zhou, Y., Rasalingam, R.	Innovation and Challenges in Product Design Paradigms Based on Artificial Intelligence-Generated Content (AIGC)	Paper Asia, Vol. 41, Issue 4b (2025), pp. 380-392; DOI: https://doi.org/10.59953/paperasia.v41i4b.603	Literature review of AIGC applications in product design.	Synthesis of innovation paradigm shifts enabled by AIGC in design.
3.	Cultural Heritage Preservation & Digitization	Alam, M.	Preserving cultural heritage and empowering indigenous communities for sustainable development in Fiji	Social Sciences & Humanities Open, Vol. 12 (2025), Article 101760; DOI:10.1016/j	Mixed-methods approach integrating technology-assisted preservation with	Addresses intersection of digital heritage preservation, indigenous knowledge systems, and sustainable development goals.

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				.ssaho.2025.101760	community empowerment frameworks.	
4.	Design Process & Methodology	Shen, S., Lin, C., Lin, P.	Exploring AIGC Integration in Wooden Craft Design: A Case Study on Wings of Pen-Taiwan Barbet Edition	Cross-Cultural Design, CCD 2025, Part II (2025); DOI: 10.1007/978-3-031-93733-0_15	AIGC technology with human intervention curation framework for craft design.	AIGC enhances early-stage ideation; challenges persist in style consistency and integration. Examines market feasibility and consumer perception of AIGC-assisted craft products
5.	Design Process & Methodology	Wang, T., Ma, Z., Yang, L.	Creativity and Sustainable Design of Wickerwork Handicraft Patterns Based on Artificial Intelligence	Sustainability, Vol. 15, Issue 2 (2023), Article 1574; DOI: 10.3390/su15021574	Deep learning (ResNet34 + DCGAN) for pattern recognition and generation	ResNet34 recognition rates: 94.36% overall, 95.92% modern patterns, 93.45% traditional. Combines sustainability principles with AI-assisted craft pattern design
6.	Design Process & Methodology	Liang, J.	The application of artificial intelligence-assisted technology in cultural and creative product design	Scientific Reports, Vol. 14, Issue 1 (2024); DOI: 10.1038/s41598-024-82281-2	Variational Autoencoders (VAE), Reinforcement Learning (RL) hybrid model	User satisfaction 95%, SSIM 0.92, model accuracy 93%, loss reduction to 0.07. Advanced ML framework for cultural product design optimization
7.	Design Process & Methodology	Hwang, Y., Jeong, S., Wu, Y.	Artificial Intelligence in Design Process: An Analysis Using Text Mining	Applied Artificial Intelligence, Vol. 39, Issue 1 (2025); DOI: 10.1080/08839514.2025.2453782	Text mining of 126 papers; keyword frequency analysis across design stages (research, ideation, mock-up, production, evaluation)	AI predominantly discussed in production (late stage), underutilized in mock-up. Distinct discipline patterns. Comprehensive meta-analysis of AI's positioning in design.
8.	Design Process & Methodology	Liu Y., Laoakka S.	Digital Education: The Inheritance and Development of Chinese Shu Embroidery Culture	International Journal of Education & Literacy Studies	Mixed research method: Field investigation methods,	AIGC technology, Text-to-image pattern creation method. Multidimensional information of Shu

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				ISSN: 2202-9478, https://journals.aiac.org.au/index.php/IJELS/article/view/8430	surveys, observations, interviews, and focus group discussions.	embroidery patterns: cultural and historical background, embroidery techniques, digital resource.
9.	Design Process & Methodology	Lee, Y.K.	How complex systems get engaged in fashion design creation: Using artificial intelligence	Thinking Skills And Creativity, Vol. 46 (2022), December 2022; DOI:10.1016/j.tsc.2022.101137	Comparison of GAN-generated vs. human design; analysis of complex system elements	Establishes Human-AI collaborative design-generation model. Theoretical framework for complex system engagement in AI-assisted fashion
10.	Design Process & Methodology	Messer, U.	Co-creating art with generative artificial intelligence: Implications for artworks and artists	Computers in Human Behavior: Artificial Humans, Vol. 2, Issue 1 (2024), Article 100056; DOI:10.1016/j.chbah.2024.100056	Analysis of human-AI co-creation in artistic contexts; examination of creative implications and artistic agency	Explores implications of generative AI for artistic creation, artwork authenticity, and artist identity in collaborative creative processes
11.	Design Process & Methodology	Wang, B., Han, J., Zhao, X., Yin, Y., Chen, L., Childs, P.	Creative combinational design through generative AI in different dimensional representations	Design And Artificial Intelligence, Vol. 1, Issue 1 (2025), Article 100006; DOI:10.1016/j.daai.2025.100006	Generative AI for multi-dimensional creative design exploration	Explores dimensional representation strategies in AI-assisted creative design
12.	Heritage Ceramics & Pottery	Liang, J., Li, Y., Xiong, Z., Huang, Q.	Advancing lacquerware design through human-AI collaboration with controllable diffusion models	Scientific Reports, Vol. 16, Issue 1 (2025); DOI: 10.1038/s41598-025-33119-y	Human-in-the-loop AIGC system with diffusion models (text-to-image, image-to-image with ControlNet)	System generates culturally consistent designs while reducing artisan conceptualization time. Exemplary model of true human-AI co-creation in heritage craft
13.	Heritage Ceramics & Pottery	Zhou, Y., Liu, Y., Shao,	Fine-tuning diffusion model to generate new	Scientific Reports, Vol. 15, Issue 1	Diffusion model fine-tuning with	AI-generated kite designs replace traditional hand-

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		Y., Chen, J.	kite designs for the revitalization and innovation of intangible cultural heritage	(2025); DOI: 10.1038/s41598-025-92225-z	novel loss function incorporating auspicious cultural themes; Traditional Kite Style Patterns Dataset	painted creation. Direct application to endangered craft preservation and innovation
14.	Heritage Ceramics & Pottery	Bao, Q., Zhao, J., Liu, Z., Liang, N.	AI-Assisted Inheritance of Qinghua Porcelain Cultural Genes and Sustainable Design Using Low-Rank Adaptation and Stable Diffusion	Electronics, Vol. 14, Issue 4 (2025), Article 725; DOI: 10.3390/electronics14040725	Stable Diffusion - LoRA technology; hybrid model for feature classification	AIGC facilitates integration of traditional-modern design; enhances efficiency and precision while maintaining artistic consistency. Combines cultural gene preservation with innovation
15.	Heritage Ceramics & Pottery	Pan, S., Anwar, R.B., Awang, N.N.B., He, Y.	Constructing a Sustainable Evaluation Framework for AIGC Technology in Yixing Zisha Pottery	Sustainability, Vol. 17, Issue 3 (2025), Article 910; DOI: 10.3390/su17030910	Emotional design theory - Delphi method-Analytic Hierarchy Process (AHP); expert consensus-based framework	AIGC enhances design diversity, functionality, and efficiency while maintaining cultural authenticity. Comprehensive sustainability framework for pottery design.
16.	Heritage Ceramics & Pottery	Zhou, C., Wu, J., Fu, X., Bao, Q., & Tao, Y.	AIlantern: An AI-assisted workflow for designing and crafting intangible cultural heritage lantern	Journal of Engineering Design, Vol. 1 (2025), pp. 1-32; DOI: 10.1080/09544828.2025.2552097	AI-assisted workflow integrating design ideation, customization, and production planning for heritage lantern crafting	Demonstrates practical implementation of AI in intangible cultural heritage preservation; enables customization while maintaining traditional craftsmanship
17.	Heritage Ceramics & Pottery	Ren, H.	Development and Application of Ceramic Cultural and Creative Products Based	Wireless Communications & Mobile Computing, Vol. 2022	AI technology for ceramic cultural product development	AI significantly improves product development effectiveness; pattern extraction levels

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			on Artificial Intelligence	(2022); DOI: 10.1155/2022/5733761	and application	reach 0.73 vs. 0.66 without AI
18.	Jewelry & Decorative Arts	Lyu, L., Shi, M., Zhang, Y., Lin, R.	From Image to Imagination: Exploring the Impact of Generative AI on Cultural Translation in Jewelry Design	Sustainability, Vol. 16, Issue 1 (2024), Article 65; DOI: 10.3390/su16010065	Design-action experiment (46 student designers, 30 expert evaluators)	AI impacts ideation depth; shifts focus from technical to strategic decisions; human-AI communication challenges. Empirical evidence of AI's impact on designer creativity
19.	Jewelry & Decorative Arts	Magee, M.D.	Generative Artificial Intelligence as a Tool for Jewelry Design	Gems & Gemology, Vol. 60, Issue 3 (2024), pp. 330-342; DOI:10.5741/GEMS.60.3.330	Comparative analysis: Midjourney, DALL-E, Stable Diffusion, Leonardo, Firefly for jewelry image generation	Evaluates ethical, legal, and regulatory considerations in AI-generated jewelry art. Comprehensive ethical framework for AI adoption in jewelry industry
20.	Jewelry & Decorative Arts	Cheng, Z., Zhao, J., Chen, L., Yan, Y.	GuoFengAI: Constructing an AI-Generative LoRA Model for Chinese Aesthetic Jewelry	Design, User Experience, And Usability, DUXU 2025, Part III (2025); DOI:10.1007/978-3-031-93227-4_1	LoRA-based generative model with ComfyUI tool, AI 3D transformation with manual optimization	Outperforms mainstream generative AI models in performance, cultural integration, and operational efficiency. Demonstrates AI-driven preservation of traditional Chinese cultural aesthetics
21.	Jewelry & Decorative Arts	Jiang, A., Huan, M., Choi, D., Kang, Y.	Optimizing eco-friendly jewelry design through an integrated eco-innovation approach using artificial neural networks	Scientific Reports, Vol. 15 (2025), Article 1; DOI:10.1038/s41598-024-84477-y	Artificial Neural Network (ANN) for predicting environmental impacts based on material and design properties	Biomaterials show carbon footprint 1.1-1.2 kg vs. 2.1 kg precious metals; simplified designs reduce impact by 60%. Quantitative framework for sustainable jewelry design

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22.	Jewelry & Decorative Arts	Tenuta, L., Testa, S., Freitas, F.A., Rossato, B., Cappellieri, A.	The Integration of Artificial Intelligence in Jewellery Design Processes	Design Commit: 1st International Conference On Design & Industry 2024 (2024); Doi:10.48528/Pvy2-Ww14-49; Pp. 550-562	Systematic analysis of AI integration across jewelry design phases (research, design, communication)	Identifies opportunities and limitations at each design stage. Comprehensive process-based framework for AI adoption
23.	Sustainable Entrepreneurship & Business Models	da Silva, F.M., Liberti, R., Di Sarno, S., Alfieri, V.	Industry 5.0 and Sustainable Fashion: Future Prospects for Designers in the Era of Smart Factory and Artificial Intelligence	Design Commit: 1st International Conference On Design & Industry 2024 (2024); DOI:10.48528/PVY2-WW14-91; pp. 988-999	Analysis of smart factories; AI in sustainable fashion; Industry 5.0 paradigm	Integration of creativity, technological skills, and environmental sensitivity essential. Frameworks for sustainable design entrepreneurship in AI-enabled manufacturing
24.	Sustainable Entrepreneurship & Business Models	Schinello, S.	Challenges and Opportunities in the Use of Artificial Intelligence in Creative Economy	Economics & Sociology, Vol. 18, Issue 1 (2025), pp. 199-216; DOI: 10.14254/2071-789X.2025/18-1/10	Semi-structured expert interviews (n=5 Lithuanian experts) + literature analysis	AI expands creative possibilities but raises concerns about originality, quality, copyright. Job displacement risks. Need for EU regulatory frameworks
25.	Sustainable Entrepreneurship & Business Models	Đorđević, L., Bakator, M., Novaković, B., & Đurđev, M.	Building Competitiveness in Industry 5.0: The Role of AI in Improving Production Efficiency	Networks and Systems, Vol. 1069 (2024), pp. 435-442; Editors: I. Karabegovic, A. Kovačević, S. Mandzuka; Publisher: Springer Nature Switzerland; DOI: https://doi.org/10.31181/jscda31202564	Analysis of AI's role in Industry 5.0 manufacturing competitiveness and production efficiency optimization;	Examines strategic integration of AI technologies for competitive advantage in smart manufacturing and sustainable production paradigms

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26.	Sustainable Entrepreneurship & Business Models	Garcia, M.B.	The Paradox of Artificial Creativity: Challenges and Opportunities of Generative AI Artistry	Creativity Research Journal, Vol. 37, Issue 4 (2025), pp. 755-768; DOI:10.1080/10400419.2024.2354622	Analysis of AI's intersection with artistic creation; examination of authenticity, IP, and ethical challenges	Frames AI integration as cultural shift requiring reevaluation of art and artist definitions. Critical analysis of AI's role in democratic access to creative practices.
27.	Textile Heritage & Embroidery	Yang, H., Sui, Q., Hu, B., et al.	A semantic reconstruction and AI-controlled generation method for the cultural genes of Qing Dynasty embroidery patterns	NPJ Heritage Science, Vol. 13, Issue 1 (2025); DOI: 10.1038/s40494-025-02217-5	LoRA-Diffusion-SG architecture with multi-source datasets (image, knowledge, craftsmanship layers)	CLIP similarity 0.78-0.82, symbol recognition accuracy 82-85%, F1-score 0.87-0.89. Direct human-AI collaboration in traditional embroidery design with cultural authenticity preservation
28.	Textile Heritage & Embroidery	Xiao, Y., Lin, X., Ji, T., Qiao, J., Ma, B., Gong, H.	AI-Assisted Design: Intelligent Generation of Dong Paper-Cut Patterns	Electronics, Vol. 14, Issue 9 (2025); DOI: 10.3390/electronics14091804	Designer-in-the-loop model with LoRA fine-tuning and ControlNet structural guidance	Effective generation of specific-style paper-cut patterns with limited sample data. Proposes novel designer-in-the-loop collaborative design model for endangered craft heritage
29.	Textile Heritage & Embroidery	Chen, L., Su, Z., He, X., Chen, X., Dong, L.	The application of robotics and artificial intelligence in embroidery	Assembly Automation, Vol. (2022) 42 (6): 851–868; DOI:https://doi.org/10.1108/AA-07-2022-0183	Robotics + AI integration in traditional embroidery production	Identifies both challenges and benefits in mechanizing craft processes. Explores automation while maintaining craft authenticity
30.	Textile Heritage & Embroidery	Srivastava, A., Saxena, A.	The Loom of Legacy: Deciphering Banarasi Craftsmanship	Textile; Publisher: Taylor & Francis; (2025) https://doi.org/10.1080/14759756.2025.2491728	Heritage textile documentation and digital preservation analysis	Focuses on heritage textile preservation through digital means

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31.	Textile Heritage & Embroidery	Jyoti Kaur, P., & Singh, C.	Phulkari 2.0: Generative Pattern Systems And Ai-Driven Embroidery Futures In Punjabi Textile Tradition	Vidya - A Journal Of Gujarat University, Vol. 4, Issue 2 (2025), pp. 346-354; DOI: 10.47413/504 har50	Generative pattern systems and AI-driven design exploration for traditional Punjabi embroidery	Advances Phulkari embroidery tradition through AI-assisted pattern generation while preserving cultural authenticity of Punjabi textile heritage.
32.	Textile Heritage & Embroidery	Abdel Halim, M.S., Ibrahim, G.E., Abdel Tawab, F.M.	Utilizing Artificial Intelligence Technical to develop some Textile Craft Industries	International Design Journal, Vol. 14, Issue 5 (2024), pp. 43-63; DOI:10.21608 /idj.2024.372636	AI application in traditional textile craft development	AI technology improves product development effectiveness and application. Demonstrates industrial-scale application of AI in traditional textile sectors.
33.	Textile Heritage & Embroidery	Yu, Q.; Tao, X.; Wang, J.	Sustainable Design on Intangible Cultural Heritage: Miao Embroidery Pattern Generation and Application Based on Diffusion Models	Sustainability 2025, 17, 7657. https://doi.org/10.3390/su17177657	Stable Diffusion and low-rank adaptation (LoRA) fine-tuning	The proposed model outperforms the original diffusion model in terms of pattern quality and style consistency, with optimal results obtained under a LoRA scale of 0.8–1.2 and diffusion steps of 20–40.

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