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Human-Centered Design in Batik Regeneration: The Role of Artisans in Sustainability of Products and Nusantara Traditions

Desy Nurcahyanti[a]*, Ernest Irwandi[b]

[a]Master of Arts, Faculty of Arts and Design, Universitas Sebelas Maret, Indonesia
[b]Master of Design, BINUS University, Indonesia

ABSTRACT

The Indonesian batik tradition, globally recognized by UNESCO as Intangible Cultural Heritage, currently faces a serious existential threat: a crisis in the generational succession of artisans. Declining interest among the younger generation in pursuing the craft of hand-drawn (*tulis*) and stamped (*cap*) batik threatens the tradition's continuity and risks eroding the intangible knowledge—or tacit knowledge—embedded in the philosophy of its decorative motifs and the spiritual processes of its creation. This study examines the application of Human-Centered Design (HCD) methodology as a new paradigm for redesigning the batik artisan ecosystem. Unlike conventional design innovations that focus solely on the final visual product, the HCD approach positions artisans not as mere objects or production cost factors, but as collaborative partners and cultural innovators. Utilizing the five-stage HCD framework (Empathize, Define, Ideate, Prototype, Test), the research analyzes the motivational structure of the younger generation, revealing that the sustainability of the artisan profession relies primarily on financial stability (40%) and social status or pride (30%), followed by work flexibility (20%) and cultural preservation awareness (10%). The findings confirm that while the protection of batik products can be achieved through digital technology, the sustainability of the batik tradition itself absolutely requires human agents—the artisans. Implementing HCD transforms the batik ecosystem from a mere manufacturing supply chain into an empowered ecosystem that ensures the dignity, intellectual autonomy, and economic well-being of the artisans.

KEYWORDS

Artisan Regeneration, Batik Nusantara, Human-Centered Design (HCD), Ecosystem Innovation. Tradition Sustainability, Tacit Knowledge

Introduction

Batik Nusantara is far more than mere fabric adorned with geometric or naturalistic patterns; it is a cultural manifestation rich in philosophical, historical, and spiritual significance. UNESCO's 2009 recognition of Indonesian Batik as a "Masterpiece of the Oral and Intangible Heritage of Humanity" underscores that the essence of Batik lies in its entire traditional creation

*Corresponding Author
desynurcahyanti@staff.uns.ac.id

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process—involving tools like the *canting*, the use of *malam* (batik wax), natural or synthetic dyes, and the philosophy behind motif application passed down through generations [1].

However, as we enter the third decade of the 21st century, Indonesia's batik ecosystem stands at a critical juncture. A paradox of growth has emerged while the commercial market and appreciation for batik-patterned fashion are expanding rapidly, traditional batik production centers spanning Pekalongan, Surakarta, Yogyakarta, Lasem, and Madura are witnessing a drastic decline in the number of young artisans [2]. The profession of creating *batik tulis* (hand-drawn Batik) and *batik cap* (stamped Batik) is facing a systemic shortage of successors [3].

The succession of batik artisans is at a critical juncture, as the profession is increasingly losing its appeal among the younger generation, despite batik being one of the nation's most valuable economic and creative assets. This waning interest is often driven by the stigma that being a traditional artisan equates to slow, manual labor and unpromising economic prospects amid rapid industrialization [4]. However, such assumptions obscure the fact that the highest value of batik fabric lies precisely in the human touch, meticulousness, and technical skill that can only be mastered through long-term dedication. Without a succeeding generation passionate about the creation process, the ecosystem of authentic batik production risks extinction. The loss of these skilled artisans would ultimately undermine the quality and innovation that have long served as the primary strengths of Indonesian textiles in the broader market [5].

The urgency of cultivating a new generation of artisans is paramount when considering the prospects of Indonesian batik in the international fashion arena. The global fashion ecosystem is currently undergoing a massive shift toward paradigms of "slow fashion" and ethical fashion, with international consumers increasingly seeking garments that offer handcrafted authenticity, compelling product narratives (storytelling), and sustainable production processes. Within this global market context, batik holds a golden opportunity to transform from a mere local textile into a visionary contemporary fashion product with high-end competitiveness [6]. Meeting the high global demand for this exclusive textile requires skilled young artisans. They are the key to blending superior manual craftsmanship with international fashion aesthetics—a fusion that will ultimately ensure Indonesian batik leads and dominates global high-end fashion trends [7].

The issue of generational renewal stems from a misconception that views artisans merely as low-cost manufacturing units. A lack of economic incentives, unfavorable working conditions, and the social stigma branding the craft as "manual labor" have stifled the younger generation's interest in pursuing this trade. If this crisis of succession is left unaddressed without appropriate, methodical intervention, Indonesia risks losing the *tacit knowledge*—the intuition, fine motor skills, and spiritual sensitivity involved in batik making—that cannot be replicated by modern automated machinery [8].

Methods

This study employs a qualitative approach based on design-led research (or research through design), integrated with the Human-Centered Design (HCD) methodological framework. This approach was selected for its ability to explore in depth the socio-economic realities of the

artisans and to generate contextual interventions grounded in the users' actual needs in the field. The HCD methodology applied here is non-linear. Field testing during the "Test" phase does not mark the conclusion of the design process. When feedback from artisans reveals a mismatch between the prototype solution and their daily context, the researcher iterates back to the "Ideate" stage, or even the "Empathize" stage, to revise fundamental assumptions [9].

Table 1. The Execution of This Design Research Follows The Five Iterative Stages of HCD

HCD Stage	Primary Activity Focus	Methodological Output
1. Empathize	Participatory observation, in-depth interviews, and ethnography with veteran and young artisans in the batik center.	Creation of empathy maps; profiling of artisans' motivations and daily challenges.
2. Define	Synthesize qualitative and quantitative data to identify the root cause of issues within the artisan ecosystem.	Formulate the core problem statement (Point of View / Problem Statement).
3. Ideate	Co-design workshop session with the artisan community, academics, and designers.	Ideas for ecosystem innovation, modern training modules, and flexible working models.
4. Prototype	Creation of physical and non-physical prototypes (work systems, training instruments, professional branding).	Prototypes of intervention modules and new work system schemes for young artisans.
5. Test	Live field testing of the prototype with a group of young artisans at a batik center.	Validation feedback, operational feasibility evaluation, and recommendations for further iteration.

Building on the preceding discussion, the Human-Centered Design (HCD) research method is an iterative framework that places user needs at the core of the problem-solving process across five key stages, beginning with Empathize and Define. During the Empathize stage, researchers gather in-depth data through participant observation and interviews to understand the target users' perspectives, emotions, and real-world constraints, free from the bias of initial assumptions [10]. The insights gained from this empathetic engagement are subsequently analyzed and synthesized in the Define stage to formulate a precise, human-centric problem statement. A study by Chen and Lin in the International Journal of Human-Computer Interaction underscores that the success of this problem-definition phase hinges heavily on the quality of the empathetic data collected; a solid foundation established during these two stages prevents the risk of developing systems that fail to align with the users' actual circumstances [11].

As the process transitions from problem understanding to solution creation, it moves into the Ideate and Prototype stages. During the Ideate stage, the research team engages in divergent idea exploration—typically through brainstorming sessions—to generate as many creative solution alternatives as possible, free from rigid evaluative constraints at the outset. The most promising ideas are then given tangible form during the Prototype stage, ranging from rough (low-fidelity) sketches to interactive prototypes that closely resemble the final product (high-fidelity). According to Garcia et al. (2024) in the journal *Design Studies*, rapid prototyping

enables teams to visualize information architecture and design interactions at a low cost, thereby creating a safe space for experimentation and the early identification of potential design flaws [12].

The HCD process concludes and is refined through the Test phase, where prototypes are tested directly with end-users to evaluate the solution's usability, accessibility, and effectiveness. This evaluation serves not merely as a final validation step but as a driver of iteration; critical user feedback often prompts researchers to refine the prototype, modify core ideas from the Ideate phase, or even re-examine the problem itself during the Empathize phase. A comprehensive study by Sharma and Patel, published in “Applied Ergonomics”, highlights that this iterative testing process is a key differentiator between HCD and traditional methods, ensuring that research outcomes are not only technically feasible but also precisely capable of addressing the root cause and delivering a meaningful user experience [13].

Result

Based on the synthesis of data from the Empathize and Define stages, the crisis in the regeneration of batik artisans did not occur by chance; rather, it stems from a combination of three key, interlocking factors: 1). Professional Stigma: Societal constructs categorize batik artisans as low-status "manual laborers" rather than recognizing them as craft artists or cultural intellectuals. This stigma diminishes the younger generation's confidence in choosing batik as a career path; 2). Economic Uncertainty: Traditional piece-rate wage systems result in earnings below the minimum wage, lacking health coverage or financial security for the future; 3). Threat of Losing Tacit Knowledge: The absence of adaptive mentorship methodologies makes the transfer of batik-making skills feel tedious and rigid to the "digital native" generation.

Through in-depth exploration during the "Empathize" phase—involving prospective successors (young people aged 18–25), senior artisans, and production workshop owners—followed by the categorization of problem patterns in the "Define" phase, this study successfully mapped the generational succession crisis to three interconnected root causes. The synthesis of the empathy map reveals a stark perceptual gap between the aesthetic value of batik fabric as a product and the social status of the artisans who create it. Young people do not view the artisan profession as a source of pride or a desirable career, but rather as low-income manual labor [14].

Interview results indicate that the majority of young people in the batik center associate batik-making activities—such as *mola* (tracing), *nyanting* (wax-drawing), and coloring—with informal work linked to old age, poverty, and technological backwardness. Batik-making is not viewed as a profession offering a clear career path. Interestingly, findings from the "empathize" phase reveal that the discouragement against becoming artisans often comes from the young people's own parents, who are themselves artisans [15]. Senior artisans tend to dissuade their children from following in their footsteps, prioritizing formal education instead so they can secure jobs in the formal sector—such as civil service, private-sector employment, or factory work—thereby gaining greater social prestige within the community [16].

Traditional work environments—often perceived as dirty and stuffy and reliant on manual tools—are seen as incompatible with the identities and lifestyles of Generations Z and Alpha, who value flexibility, digital technology, and modern workspaces. A synthesis of user journey maps reveals that the primary barrier preventing young people from entering or remaining in this profession is financial sustainability. The current economic model for traditional batik fails to provide financial security sufficient to meet decent living standards. Most home-based artisans are paid on a piecework or daily basis, resulting in daily earnings that often fall below the Regional Minimum Wage *(UMR)*. The high level of complexity involved in hand-drawn or stamped batik production is not commensurate with the financial compensation received directly by the artisans [17].

The traditional batik supply chain remains dominated by intermediaries—such as middlemen or collectors—who capture the largest share of the profit margin. Artisans have very little bargaining power when it comes to setting the selling prices of their own work. The production process for hand-drawn batik, which can take anywhere from weeks to months, results in slow cash flow for independent artisans [18]. Meanwhile, the proliferation of low-cost, batik-patterned textiles (factory-printed or screen-printed varieties) distorts price expectations among local consumers, thereby directly suppressing the earnings of authentic batik artisans [19].

During the Define stage, it was identified that the crisis of generational succession is not merely a matter of human resource quantity; rather, it poses a threat of a break in the transmission of tacit knowledge the intuitive insights and skilled techniques that are difficult to codify from master batik artisans to the next generation. Technical knowledge—ranging from natural dye formulations and instinctive control of wax temperatures to the finesse of *canting* strokes and an understanding of the profound philosophies behind the motifs—has traditionally been passed down informally over decades through observational learning. The absence of structured pedagogical methods or documentation, in either written or digital formats, renders the learning process extremely slow and unappealing to the younger generation [20].

The majority of those possessing high-level tacit knowledge currently fall within the 50–60+ age bracket. Without mechanization or interactive documentation methods adapted to modern learning styles, this rare knowledge is at critical risk of being permanently lost when these senior artisans retire or pass away. Younger generations attempting the craft tend to master only basic psychomotor skills, lacking an understanding of the symbolic and spiritual significance behind batik motifs. This leads to superficial design innovations, in which batik is produced merely as a visual commodity, devoid of a strong narrative identity [21].

Based on the mapping of the three root causes outlined above, the core problem statement (point of view)—which serves as a bridge to the Ideate phase—is that young people in batik production hubs require a batik work ecosystem offering economic security, social prestige, and modern learning methods; the current traditional production model places them in a financially vulnerable position and subjects them to social stigma, thereby threatening the future sustainability of local batik knowledge [22].

Discussion

To design a batik ecosystem that appeals to the younger generation, this study maps the key drivers influencing the career decisions of young people in batik centers. The synthesized data is presented in the following proportional visualization: 1). 40% - Financial stability; 2). 30% - Status & pride; 3). 20% - Work flexibility; and 4). 10% - Cultural preservation.

Through the HCD paradigm, design interventions aim to restructure artisans' position within the batik industry value chain. Artisans of the future are liberated from the role of mere executors of wax-resist lines; instead, their capabilities are elevated, transforming them into agents of cultural change and economic innovators. By integrating digital technologies—such as using social media for storytelling and direct marketing, and employing computer-aided design (CAD) for initial pattern creation—young artisans can elegantly blend the tradition of meticulous craftsmanship with modern efficiency.

HCD shifts the focus of innovation from mere 'visual product innovation' (creating new patterns or color combinations) to 'artisan ecosystem innovation.' Within this new ecosystem framework: 1. Asset Revaluation: Artisans are no longer treated merely as production costs (cost centers) but are viewed as invaluable intellectual assets and forms of cultural capital; 2. Autonomy and Dignity: Artisans hold copyright or ownership stakes in the motif designs they develop and are afforded space for individual expression; 3. Organic Regeneration: When the artisan profession offers competitive income and social prestige, the process of generational renewal occurs naturally and organically, without the need for external coercion.

Conclusion

The generational succession crisis among batik artisans poses a genuine threat to the sustainability of this archipelago tradition. The application of Human-Centered Design (HCD) offers a new conceptual framework that places the individual—the artisan—at the heart of the craft's sustainability. Key research findings underscore a fundamental distinction between producing "batik cloth" and upholding the "batik tradition." While automation technology can replicate the visual aspects of batik, the soul of the tradition—encompassing patience, spiritual values, and tacit knowledge—can only be preserved by human beings. By aligning the craft ecosystem with the primary motivations of the younger generation (40% financial stability and 30% social status), HCD has proven capable of transforming artisans' standing into that of highly competitive players in the creative economy.

Based on the discussion, the following recommendations have been formulated: 1. For the government and policymakers: Establish decent remuneration standards for traditional craft artisans, integrate craft-based Human-Centered Design (HCD) curricula into vocational schools, and provide professional certification based on the appreciation of artistic work; 2. For communities and batik centers: Adopt collaborative governance models that involve young artisans in design decision-making processes and digital marketing chains.

For design academics and researchers: Expand applied HCD research to other Indonesian craft commodities (such as weaving, woodcarving, and pottery) to comprehensively safeguard intangible heritage.

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