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Transcending VUCA Challenges through the Development of Superior Human Resources for the Sustainability of Batik Madura

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Abstract

In an era characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), traditional industries such as Madura batik face tremendous challenges in maintaining their existence. Social transformation, technological advancements, and shifting market preferences demand rapid and strategic adaptation. This article discusses the importance of developing superior human resources (HR) as the key to sustaining the Madura batik industry in the face of VUCA dynamics. Using a qualitative-descriptive approach, this study explores local potential, skill development strategies, and strengthening of work character rooted in culture. Findings indicate that the sustainability of the Madura batik industry is strongly influenced by the ability of local artisans to address VUCA challenges, such as raw material price fluctuations, market preference shifts, limited access to technology, and insufficient contextual training. Synergy among artisan communities, educational institutions, government, and creative industries is required to foster a sustainable learning ecosystem. By building competent and competitive human resources, Madura batik has the potential not only to survive but also to thrive as a global cultural identity.

Kata Kunci:
VUCA; Sumber Daya Manusia; Batik Madura; Industri Kreatif; Pelestarian Budaya

Abstrak

Era yang ditandai oleh volatilitas, ketidakpastian, kompleksitas, dan ambiguitas (VUCA), pelaku industri tradisional seperti batik Madura menghadapi tantangan besar dalam mempertahankan eksistensinya. Terjadinya transformasi sosial, kemajuan teknologi, serta perubahan preferensi pasar menuntut adaptasi yang cepat dan strategis. Artikel ini membahas pentingnya membangun sumber daya manusia (SDM) unggul sebagai kunci keberlangsungan industri batik Madura dalam menghadapi dinamika lingkungan VUCA. Melalui pendekatan kualitatif-deskriptif, kajian ini mengeksplorasi potensi lokal, strategi pelatihan keterampilan, dan penguatan karakter kerja berbasis budaya. Penelitian ini menunjukkan bahwa keberlangsungan industri batik Madura sangat dipengaruhi oleh kemampuan SDM lokal dalam menghadapi dinamika lingkungan VUCA (Volatility, Uncertainty, Complexity, dan Ambiguity). Tantangan utama yang dihadapi pengrajin meliputi ketidakstabilan harga bahan baku, perubahan selera pasar, keterbatasan akses terhadap teknologi, serta minimnya pelatihan yang kontekstual. Diperlukan sinergi antara komunitas pengrajin, lembaga pendidikan, pemerintah, dan pelaku industri kreatif untuk menciptakan ekosistem pembelajaran berkelanjutan. Dengan membangun SDM yang kompeten dan berdaya saing, batik Madura berpeluang tidak hanya bertahan,

	tetapi juga berkembang sebagai identitas budaya masyarakat madura secara global.
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INTRODUCTION

The batik industry in Indonesia, as both a manifestation of cultural wealth and a driver of the creative economy, faces an unprecedented period of transformation. Since UNESCO's recognition of batik as an Intangible Cultural Heritage of Humanity in 2009, its cultural and economic values have been increasingly acknowledged (Evita et al., 2022). Among the diverse Indonesian batik traditions, Madura batik offers unique characteristics through its bold patterns, vibrant colors, and deep philosophies reflecting the resilient and independent character of the Madurese people.

However, the sustainability of this sector, especially for small-scale artisans in Madura, is at a crossroads due to the realities of VUCA: volatility, uncertainty, complexity, and ambiguity (N. Bennett & Lemoine, 2014a, 2014b; R. Bennett & Rundle-Thiele, 2004). These conditions are evident in fluctuating raw material prices, unpredictable consumer demand, rapid technological disruptions, and ambiguous information environments. For artisans relying heavily on hereditary skills and traditional production methods, the VUCA environment demands not only cultural preservation but also the active development of new competencies (Susanti et al., 2022).

This article examines how VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) affects Madura batik artisans and identifies strategies to develop stronger human resources so they can overcome these challenges. The main focus is on improving artisans' skills, adaptability, and resilience to keep Madura batik competitive and sustainable in a fast-changing environment.

Current research on creative industries mostly discusses digital innovation, market change, and sustainability, but it rarely focuses on traditional craft sectors like Madura batik. Although VUCA is widely used in management and HR studies, very few studies apply it to rural, culture-based industries. Most existing works also tend to look at market or production problems separately, without connecting them to how artisans develop their skills, learn from experience, or adapt to uncertainty. This creates a clear research gap.

This study helps fill that gap by showing how Madura artisans experience VUCA conditions and what HR development strategies can support them, including strengthening skills, cultural knowledge, and digital readiness. Understanding these processes is important because the batik industry is currently facing unstable raw material prices, changing consumer preferences, limited technology access, and the lack of suitable training.

The urgency of this research is both practical and theoretical. Practically, stronger HR is needed to maintain business continuity and preserve cultural heritage. Theoretically, the study expands HRD and VUCA discussions beyond formal companies and shows that traditional artisans also use creative, adaptive strategies to survive in uncertain conditions. This makes the findings relevant for future HRD programs, government support, and further academic studies.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 The VUCA Concept

VUCA, introduced by the U.S. Army War College at the end of the Cold War, describes environments characterized by volatility, uncertainty, complexity, and ambiguity (Aris et al., 2019). Applied to business and cultural industries, it underscores external pressures that demand organiza-

tional and individual adaptability (N. Bennett & Lemoine, 2014b). For Madura batik, volatility manifests in fluctuating demand and raw material costs; uncertainty in unpredictable policy changes and market shifts; complexity in interconnected supply chains and digital distribution; and ambiguity in incomplete or conflicting information.

2.2 Human Resource Management (HRM) in the VUCA Era

Human resources have shifted from being merely operational to strategic assets in uncertain environments. (Armstrong & Taylor, 2023) highlight HRM as a strategic approach to managing people to achieve organizational goals. Within VUCA contexts, HRM emphasizes:

a) **Competency Development:** Both technical (batik design, digital tools) and soft skills (critical thinking, problem-solving, creativity (K. Wright et al., 2000; T. A. Wright & Cropanzano, 2000).

b) **Lifelong Learning:** Continuous learning and adaptation to evolving trends (Fischer, 2000; Laal & Salamati, 2012).

c) **Digital Literacy:** Essential for online marketing, design, and inventory management (Gilster & Glister, 1997; Reddy et al., 2020).

d) **Resilience:** The ability to recover and remain adaptive under pressure (Luthans et al., 2006; Wilson, 2012).

2.3 Competitiveness of SMEs

Micro, small, and medium enterprises (MSMEs) are central to Indonesia's economy. Competitiveness is not only determined by product quality or cost but also by innovation, operational efficiency, market access, and HR quality (Porter, 1985, 2008; Suryana & Bayu, 2014). In the batik sector, HR excellence is the foundation for sustaining competitiveness.

METHOD

This study employed a qualitative descriptive approach to obtain rich, contextualized insights into human resource development practices within the Madura batik industry under volatile, uncertain, complex, and ambiguous (VUCA) conditions. A qualitative design was chosen to allow a deep exploration of artisans' experiences, organizational practices, and the socio-cultural dynamics shaping HR development across local batik clusters (Creswell, 2014). The research adopted a case study strategy, as proposed by (Yin, 2018), to investigate real-life HRD processes in three prominent batik-producing regions: Tanjung Bumi (Bangkalan), Klampar (Pamekasan), and Jungkarang (Sampang). These locations were selected because of their long-standing batik traditions, the presence of multi-generational artisans, and their varying levels of institutional and market support.

Data were collected from 22 informants, consisting of artisans (10 people), SME owners or managers (6 people), cultural figures and community leaders (3 people), and local government officials involved in industry development (3 people). Informants were selected using purposive sampling based on several criteria: (1) having a minimum of three years of experience in the batik industry; (2) being directly involved in HR-related roles such as training, skill transmission, or workforce management; (3) representing different positions in the value chain (production, management, cultural preservation, and regulation); and (4) willingness to participate and provide rich, reflective information. For triangulation purposes, the sample also included individuals with varied ages, socio-economic backgrounds, and organizational roles to ensure multiple perspectives on HRD challenges in VUCA contexts.

Primary data were obtained through in-depth semi-structured interviews, prolonged participatory observations of production activities and skill-transfer processes, and direct documentation in the field. Interviews explored topics such as skill mastery, training mechanisms, performance expectations, generational knowledge transfer, and adaptation strategies during uncertainty. Observations enabled the researcher to examine real-time interactions, workflows, production behaviors, and informal learning dynamics among artisans. Secondary data—including government reports, academic

literature, and NGO program documentation—served to contextualize findings and verify the consistency of information provided by informants.

Data analysis was conducted through **thematic analysis** following the six-phase framework of (Braun & Clarke, 2006). First, all interview recordings were transcribed verbatim and repeatedly read to achieve familiarization. Second, initial codes were generated manually and through qualitative data software to identify meaningful patterns related to HR competencies, training systems, leadership roles, and responses to VUCA pressures. Third, codes were collated into broader themes such as traditional knowledge transmission, adaptive capacity, skill sustainability, and institutional support. Fourth, candidate themes were reviewed by comparing them with the entire dataset to ensure internal coherence and analytic depth. Fifth, themes were refined, named, and clearly defined. Finally, a narrative report was developed to illustrate relationships between themes and to interpret how HRD practices evolve in the Madura batik clusters under changing environmental conditions.

To enhance the trustworthiness of the findings, the researcher applied credibility, dependability, and confirmability procedures based on (Lincoln & Guba, 1988). **Triangulation** was carried out by comparing data across different sources, informant types, and collection techniques (interviews, observations, and documents). **Member checking** was conducted by sharing preliminary interpretations with several key informants to ensure accuracy and resonance with their experiences. **Audit trails** were maintained throughout the study process, including documentation of coding decisions, field notes, transcription records, and analytic memos, allowing an independent reviewer to trace the research process. Additionally, prolonged engagement in each field site strengthened contextual understanding and minimized researcher bias.

DISCUSSION

4.1 VUCA Challenges in the Madura Batik Industry

Findings reveal that artisans experience volatility through unstable raw material prices, uncertainty from unpredictable consumer preferences, complexity from digital marketing integration, and ambiguity in decision-making regarding innovation and market segmentation.

For instance, one artisan stated: "Sometimes material prices rise suddenly. Moreover, our motifs are considered outdated by urban consumers, leaving us confused whether to maintain tradition or follow market demands" (Interview with artisan, Pamekasan, April 2025).

These findings align with (N. Bennett & Lemoine, 2014b) assertion that VUCA requires heightened flexibility and resilience.

4.2 HR Development through Cultural-Based Strategies

Artisans emphasized the importance of HR development beyond technical skills, encompassing cultural awareness, resilience, and adaptability. Younger artisans are increasingly interested in digital design and online sales, blending traditional skills with modern demands.

One second-generation artisan remarked: "Young people want more than just following tradition. They want to sell online and create their own designs" (Interview, Tanjung Bumi, April 2025). This supports (Spencer & Spencer, 1994) competency framework, which views HR excellence as a combination of skills, values, and cultural awareness.

4.3 Collaboration and Supportive Ecosystems

Government initiatives, such as SME training programs, have contributed to HR development, though challenges remain in contextualizing training to local needs. Some artisans noted that formal training often uses overly technical language, making it difficult to apply. Collaboration under the **Triple Helix model** (Etzkowitz & Leydesdorff, 2000)—integrating government, academia, and business—is essential for creating contextual and sustainable HR development ecosystems.

CONCLUSIONS

5.1 Conclusion

This study concludes that the sustainability of the Madura batik industry is fundamentally

shaped by the capacity of its human resources to respond adaptively to VUCA conditions. The findings show that while artisans and SME owners continue to face persistent challenges—such as volatile raw material prices, evolving consumer demands, technological constraints, and the limited relevance of existing training programs—their strong cultural roots, artisanal craftsmanship, and growing openness to digital skills form a resilient basis for long-term sustainability. Across the three batik center studied—Tanjung Bumi, Klampar, and Jungkarang—HR development emerges not only as a technical necessity but also as a cultural strategy, grounded in intergenerational knowledge transfer and adaptive informal learning.

The study contributes to the understanding of HRD in traditional creative industries by demonstrating how local cultural values can coexist with modern skill demands and how artisans' resilience becomes a strategic resource in navigating uncertainty. The application of a thematic case-study approach enriches the literature by offering an empirically grounded model of HR adaptation that integrates tradition, innovation, and community-based learning. These insights highlight that strengthening HR competencies—particularly in digital literacy, market orientation, and collaborative networks—is essential for enhancing competitiveness and preserving cultural heritage in volatile contexts.

Future research may expand this study by examining comparative cases in other Indonesian or Southeast Asian craft industries to understand how cultural uniqueness influences HRD strategies under similar VUCA pressures. Longitudinal studies are also recommended to observe how artisans' digital adoption, intergenerational learning, and market adaptation evolve over time. Additionally, quantitative or mixed-method approaches could be used to measure the impact of specific HR interventions—such as digital training, cooperative management, or government support—on artisans' performance and business sustainability. Such research would enrich the evidence base for developing more responsive and scalable HRD policies for creative industries.

5.2 Policy Implications

a) **Localized Training Curricula:** Integrate Madurese cultural values, traditional batik practices, digital skills, and entrepreneurship.

b) **Strengthened Triple Helix Collaboration:** Facilitate research-based, contextualized training through government, universities, and businesses.

c) **Digitalization and Global Promotion:** Provide artisans with access to digital marketing, marketplaces, and shared platforms.

d) **Cultural Intellectual Property Protection:** Secure legal recognition for Madura batik motifs through Geographical Indication schemes.

e) **Infrastructure and Raw Material Support:** Ensure affordable raw materials and support eco-friendly natural dye production.

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