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# Internationalization of Indonesian Eco-Print Batik: Drivers, Barriers, and Global Market Opportunities

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## Abstract

This study aims to systematically map and analyze the drivers, barriers, and global market opportunities in the internationalization process of Indonesian eco-print batik. This research employs a systematic literature review based on the PRISMA protocol, searching global databases from the last decade. From an initial pool of 650 articles, we ultimately selected 12 final articles for synthesis in analyzing the sustainability behavior of this creative industry. Analysis indicates that the primary drivers of internationalization are increasing global consumer awareness of green products, unique and authentic cultural motifs, and the emerging adoption of clean production technologies such as natural dyes and automated steam engines. However, the process faces significant hurdles, including low market awareness of local brands, strict compliance with international green industry standards, logistical inefficiencies, and limited digital marketing competencies among MSMEs. On the other hand, global market opportunities are expanding, particularly in Europe (such as Austria, Finland, and Norway) and the Middle East, through the use of global e-commerce platforms and effective digital branding strategies. This study concludes that the internationalization of Indonesian eco-print batik necessitates synergy between local wisdom-based product innovation and the adaptation of digital marketing strategies.

## Keywords

Batik Eco-print, Drivers, Export Barriers, Global Market Opportunities, Internationalization, Sustainable Fashion.

## 1. Introduction

The Micro, Small, and Medium Enterprise (MSME) sector serves as the primary pillar of the Indonesian economy, particularly through the creative batik industry, which is recognized by UNESCO as an Intangible Cultural Heritage (Gunawan et al., 2022; Idris et al., 2025). As a strategic resource, batik not only preserves national identity but also acts as a driver for social welfare through massive employment (Steelyana, 2012; Harikesa, 2020). Globally, the contribution of MSMEs, accounting for 60% of employment, is strongly reflected in the structure of the national textile industry (Dabić et al., 2019; Kunjuraman et al., 2025). Despite fluctuations in batik export values, which peaked at USD 744.79 million in 2022, the government continues to push for acceleration through strengthened brand equity and innovative business models to maintain growth momentum in the global market (Hamdani, 2018; Marganus, 2021; Rachmawati et al., 2022; Karmagatri et al., 2024).

However, Indonesian MSMEs currently face stiff competition from global producers such as China and Malaysia, which offer highly competitive prices (Gatut & Aryanto, 2010; Marganus, 2021). Internationalization challenges demand that business actors shift from price-based competition toward design excellence and compliance with international quality standards (Kurniati & Susilowati, 2019; Meldona, 2022). Key barriers, including low market awareness, strict export regulations, and logistical inefficiencies, often hinder global expansion (Masril & Suparman, 2025). In the era of digital transformation, the adoption of Industry 4.0 technologies and precise market orientation has become a critical determinant for MSMEs navigating increasingly fragmented international markets (Naglič et al., 2020).

As sustainability demands rise, the global fashion industry is being forced to transform, given that the textile sector contributes to 10% of global greenhouse gas emissions (Centobelli et al., 2022; Öndoğan et al., 2022). Modern consumers in developed markets are increasingly selective, demanding supply chain transparency and the use of eco-friendly materials. In this context, eco-print batik emerges as an innovative solution that utilizes natural biodegradable materials to minimize chemical waste (Untari et al., 2022; Cui et al., 2025). This technique leverages the archipelago's biodiversity to create sustainable designs that enhance the image of Indonesia's textile industry as a safe and sustainable fashion producer (Kusumastuti et al., 2023; Syafril & Agel, 2024; Vibriyanto et al., 2025).

The market potential for eco-print batik is highly promising, driven by the preferences of 66% of the global population who are willing to pay a premium price for ethical textile products (Nugroho et al., 2022). This unique aesthetic appeal is highly sought after in the international high-end market, yet its development requires a robust ecological branding strategy. Despite its potential, a significant research gap exists, as current literature is dominated by technical production aspects rather than systematic internationalization strategies (Meldona, 2022; Masril & Suparman, 2025).

Despite growing attention to eco-print batik, there is still a lack of comprehensive studies that systematically analyze its internationalization process by integrating drivers, barriers, and global market opportunities within a unified framework. Utilizing the PRISMA methodology, this study provides novelty through a comprehensive synthesis of eco-print batik internationalization dynamics amidst the wave of digitalization to serve as a strategic guide for policymakers. This study aims to systematically map and analyze the drivers, barriers, and global market opportunities in the internationalization process of Indonesian eco-print batik.

## **2. Literature Review**

### **2.1. Internal and External Determinants of Competitive Advantage**

Understanding the sources of competitive advantage is essential in explaining how MSMEs can sustain their position in increasingly competitive global markets. The Resource-Based View (RBV) provides a fundamental lens for examining how internal capabilities drive firm performance, and the Institution-Based View (IBV) examines the external capabilities. This research is grounded in the RBV, which posits that a firm's sustainable competitive advantage stems from the possession of resources that are valuable, rare, inimitable, and non-substitutable. In the context of eco-print batik internationalization, unique internal resources, such as technical artisan proficiency, authentic natural patterns, and intellectual capital, serve as strategic assets for penetrating global markets (Steelyana, 2012; Hamdani, 2018; Kurniati & Susilowati, 2019; Idris et al., 2025). RBV emphasizes that the ability of MSMEs to effectively manage cultural resources and local knowledge can create a robust value proposition against international competitors (Hatammimi & Gunawan, 2023; Cahyadi et al., 2024; Rahmawati & Panjaitan, 2025). The success of eco-print batik exports highly depends on the extent to which business actors can transform the archipelago's biodiversity into premium-quality products that meet global market expectations.

Complementing these internal aspects, the IBV serves as the second grand theory to explain the influence of the external environment on business strategy. IBV asserts that institutions, both formal and informal, significantly determine firm behavior through green industry standards, government policies, and international cultural norms (Kurniati & Susilowati, 2019; Qiong & Hanafiah, 2023; Masril & Suparman, 2025). For eco-print batik MSMEs, institutional barriers, such as international environmental certification requirements and complex export procedures, often represent primary challenges (Francioni et al., 2016; Kunjuraman et al., 2025). This theory aids in understanding how the interaction between Indonesian government policies and global trade regulations shapes the internationalization pathways for eco-friendly products.

### **2.2. Internationalization Process Theories in MSMEs**

The internationalization process can be seen from the Uppsala model, the born global and network theory perspective, and the network theory. At the middle-theory level, the Uppsala Model and the Born Global perspective are utilized to analyze the internationalization process of MSMEs. The Uppsala Model explains internationalization as an incremental process based on the accumulation of market knowledge and gradually increasing resource commitment (Dabić et al., 2019). The Born Global perspective suggests that many creative MSMEs today can expand internationally shortly after inception due to innovation advantages and digital technologies (Francioni et al., 2016; He & Karami, 2016; Meldona, 2022). Both theories are relevant for mapping the paths taken by eco-print batik actors to reach overseas consumers, whether through conventional export stages or by directly targeting global niche markets via online platforms.

Network Theory acts as the next middle theory, highlighting the importance of social and business relationships in facilitating internationalization. Through networks, MSMEs can gain access to market information, technological resources, and legitimacy in foreign markets that were previously difficult to reach (Meldona, 2022; Masril & Suparman, 2025). Strategic collaborations between batik artisans, international designers, trade associations, and global marketplaces represent tangible applications of network capital to reduce export transaction costs (Qiong & Hanafiah, 2023; Cahyadi et al., 2024). This theory explains how strategic collaboration serves as a solution to the limited independent resources often faced by micro and small-scale batik MSMEs.

### 2.3. Sustainable and Competitive Strategy

In relation to sustainability and competitive strategy, this can be understood through green marketing, the circular economy, and the triple bottom line. As an applied theory, Green Marketing Theory is used to analyze how eco-print batik is positioned in the global market. This theory focuses on product development, pricing, distribution, and promotion strategies that minimize negative environmental impacts while attracting eco-conscious consumer segments (Cui et al., 2025). The success of eco-print batik internationalization is heavily influenced by global consumer perceptions of sustainability claims and the authenticity of the natural materials used (Nugroho et al., 2022). By implementing appropriate green marketing strategies, MSMEs can build strong brand images and increase purchase intentions among Millennials and Gen Z, who prioritize ethical aspects in fashion consumption.

The implementation of the circular economy and the Triple Bottom Line (TBL) are crucial applied theories in justifying the urgency of eco-print batik. The circular economy concept encourages resource efficiency through product designs that are recyclable and the use of materials without hazardous chemical waste (Körlü, 2020; Centobelli et al., 2022; Öndoğan et al., 2022). Meanwhile, TBL emphasizes that business success must be measured by the balance between profit, social responsibility (people), and environmental preservation (planet) (Untari et al., 2022; Vibriyanto et al., 2025). These theories provide an evaluative framework for the eco-print batik industry to ensure that production activities are not only economically profitable but also provide positive impacts on local ecosystems and artisan community welfare.

### 2.4. Digital Transformation and Integrative Perspective

Furthermore, digital marketing innovation and Industry 4.0 are applied to examine the role of technology in overcoming internationalization barriers. Digital marketing innovations through social media and data analytics allow MSMEs to diversify markets efficiently without a physical presence abroad (Naglič et al., 2020). The adoption of Industry 4.0 technologies, such as automated steam engines for color fixation and supply chain management software, helps improve the quality consistency of eco-print batik production (Massa et al., 2023; Ayuni et al., 2024; Karmagatri et al., 2024). These applied theories highlight that digital transformation is a primary catalyst enabling traditional products like batik to compete in the fast-paced global trade ecosystem.

The synthesis of these theories is summarized in the concept of enviropreneurship, which combines an entrepreneurial spirit with a commitment to environmental preservation. This paradigm views environmental challenges not as burdens, but as business opportunities to create innovative products with high economic value in the international market (Qiong & Hanafiah, 2023; Kunjuraman et al., 2025). Through this systematic literature review, the integration of various theoretical perspectives provides a comprehensive understanding of the internationalization dynamics of Indonesian eco-print batik (Meldona, 2022; Xiao, 2024; Rahmawati & Panjaitan, 2025; Masril & Suparman, 2025). This robust theoretical framework serves as the foundation for identifying key variables that determine MSME success in exploiting global market opportunities that increasingly lean toward sustainable fashion.

### **3. Methods**

This research strictly applies the PRISMA protocol to ensure a transparent and systematic review process. Through the stages of identification, screening, and eligibility assessment, this methodology successfully identified 12 primary articles focusing on the link between internationalization and sustainability in the eco-print batik sector. This approach aims to minimize selection bias while identifying research gaps in cleaner production and natural dye technologies.

Data synthesis was conducted by integrating management, environmental, and technological perspectives through the resource-based view framework to achieve competitive advantage for batik MSMEs. This study highlights digital adaptation as a determining factor for export competitiveness to support the Sustainable Development Goals. Furthermore, an evaluation was conducted on the correlation between green marketing strategies and consumer purchase intentions for natural dye products. The validity of the results is guaranteed through the analysis of peer-reviewed literature published over the last decade (2016–2025), which includes significant empirical studies. This methodology produced a strategic framework to map the drivers and barriers of circular economy practices within the global textile and fashion industry.

An extensive literature search was conducted across various leading global databases, including Google Scholar, MDPI, Emerald, and Frontiers. The publication timeframe of 2016–2025 was selected to capture the critical transition of the batik industry toward digitalization and the implementation of mandatory circular economy standards. The search strategy utilized Boolean operators (*AND*, *OR*) to enhance precision, using search strings such as: (“eco-print batik” *OR* “natural dye batik”) *AND* (export *OR* internationalization). This allowed the study to separate technical production data from foreign market orientation.

The screening process involved a two-stage review of titles and abstracts to ensure alignment with the research objectives, while incorporating recent export data, including Indonesia’s batik export value. This highlights the urgency of strengthening digital marketing capabilities and adapting to post-pandemic consumer behavior, particularly the growing importance of green purchase intention in craft tourism. The selection focused on indexed journal articles discussing eco-print batik, natural dyes, and international market development, with emphasis on digital literacy, sustainable production, and MSME export capacity. Both quantitative and qualitative studies in English and Indonesian were included to ensure comprehensive coverage. Non-scientific and non-peer-reviewed works were excluded, resulting in 12 selected studies that provide key insights, such as potential production cost reductions of up to 25% and the identification of major export destinations, including Switzerland, France, and the United States. Figure 1 shows the PRISMA framework for this research.

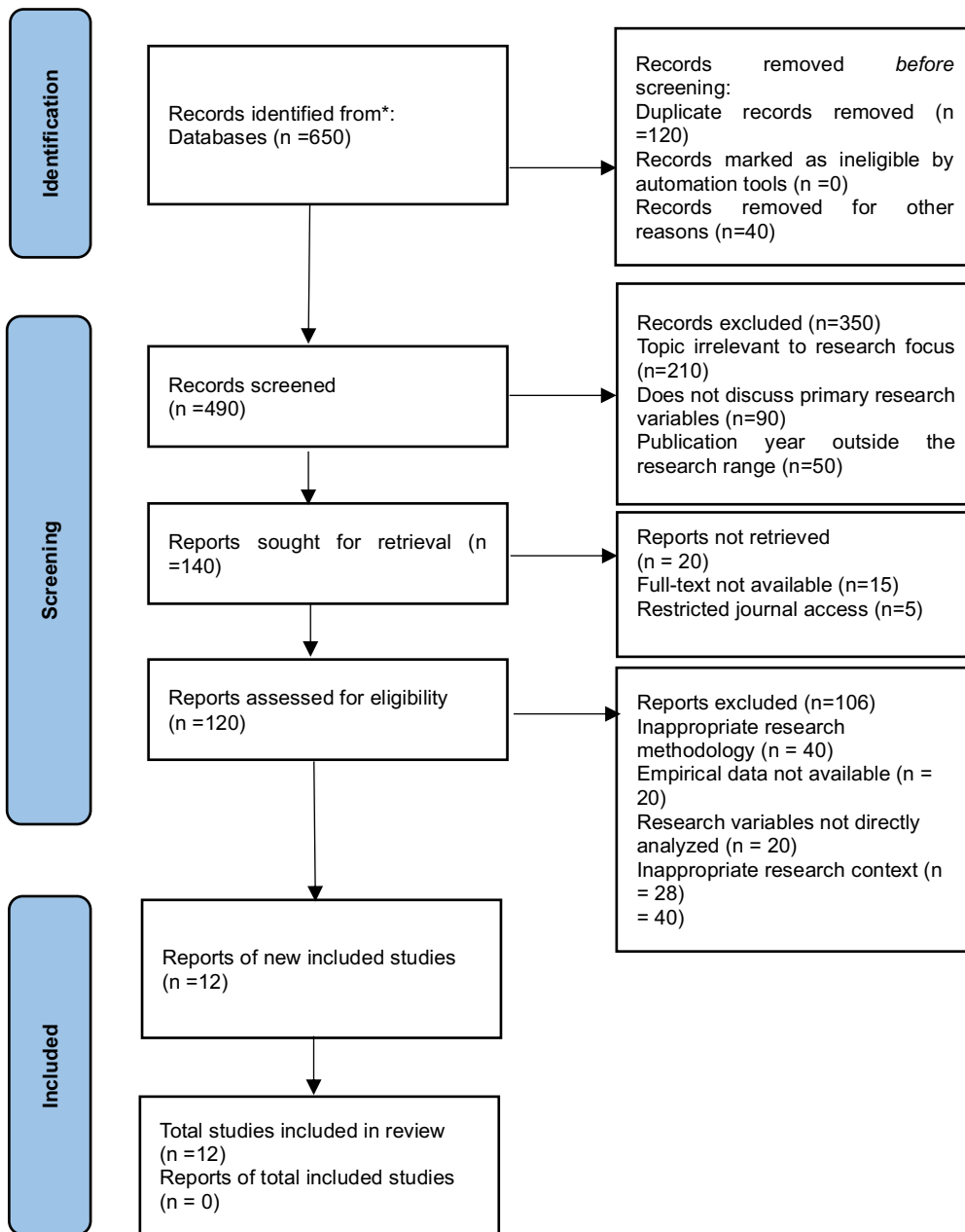


Figure 1. PRISMA Flow Diagram

## 4. Results

### 4.1. Drivers of Eco-print Batik Internationalization

The findings from this literature encompass crucial variables such as consumer purchase intention toward natural dye batik products, the use of automated steam engine technology to enhance production efficiency, and the implementation of digital marketing innovations, such as live streaming, to expand global market reach (Sunarjo et al., 2021; Ayuni et al., 2024; Krisnaresanti et al., 2025). Furthermore, this analysis summarizes the dynamics of regulatory barriers, green industry compliance standards, and logistical inefficiencies, which serve as the primary challenges in the internationalization process of sustainable textile products (Firdaus et al., 2025; Masril & Suparman, 2025). The following is a summary of the article analysis results presented in Table 1.

**Table 1.** Analysis Results of Selected Journal Articles

Author	Research Method	Main Findings
Masril and Suparman (2025)	Quantitative, Regression/SEM Analysis.	Market awareness and digital marketing innovation significantly reduce internationalization barriers.
Wulandari et al. (2025)	Quantitative, Path Analysis.	Digital literacy and technological adaptation massively increase MSME export capacity.
Kurniati and Susilowati (2019)	Empirical Study, Resource-Based View.	Synergy of internal resources and institutional support creates a sustainable competitive advantage.
Putra (2024)	Qualitative, Descriptive Case Study.	Eco-friendly certification facilitates market access to Switzerland, France, and the United States.
Sunarjo et al. (2021)	Quantitative, Survey & Statistical Analysis.	Environmental awareness significantly increases consumer purchase intention toward natural dye batik.
Krisnaresanti et al. (2025)	Action Research, Digital Technology Implementation.	Live streaming drastically increases market reach and MSME marketing efficiency.
Ayuni et al. (2024)	Technology Implementation, Experimental.	Automated steam engine technology increases production capacity and maintains natural color consistency.
Vibriyanto et al. (2025)	Case Study, Economic Impact Analysis.	The rural eco-print industry can save production costs by up to 25% through efficient techniques.
Kunjuraman et al. (2025)	Scenario Assessment.	Digitalization and focus on sustainable products are the best scenarios for batik revitalization.
Rahmawati and Panjaitan (2025)	Social Return on Investment Analysis.	Batik industry development provides high social returns for artisan communities.
Al-Shami et al. (2024)	Quantitative, survey-based regression/SEM analysis.	Financial literacy and digital financial literacy via social media significantly enhance financial inclusion among batik MSMEs in Indonesia.
Karsinah et al. (2025)	Strategy Analysis, Quantitative.	Strengthening product quality and utilizing international networks are keys to micro-export success.

Increasing global environmental awareness has become the primary driver of consumer purchase intention for sustainable products such as eco-print batik. Research indicates that consumers in international markets, particularly craft tourists, have a strong tendency to choose products using natural dyes due to their ecological value and aesthetic uniqueness (Sunarjo et al., 2021; Cui et al., 2025). The slow fashion trend, which is beginning to replace mass consumption patterns, encourages global brands to adopt more environmentally responsible production practices (Centobelli et al., 2022; Öndoğan et al., 2022). Furthermore, positive perceptions of eco-friendly products provide a competitive advantage for MSMEs, allowing them to set premium prices in high-end market segments (Pradhan & Kishore, 2025).

Digital transformation and the adoption of Industry 4.0 technologies act as catalysts that accelerate the export capacity of creative MSMEs. High digital literacy enables business actors to diversify their markets and increase export market orientation more efficiently (Naglič et al., 2020; Wulandari et al., 2025). Financial and digital financial literacy through social media use enhances financial inclusion and strengthens MSMEs' access to financial services, including batik small

enterprises in Indonesia (Al-Shami et al., 2024). The use of digital technology encompasses more than just marketing; it also includes more transparent supply chain management in accordance with the demands of the international market (Massa et al., 2023).

From an internal perspective, the sustainable competitive advantage of batik MSMEs is largely driven by intellectual capital and knowledge-based resources, particularly artisans' ability to develop natural dyeing techniques and authentic motifs that are difficult to replicate by mass producers (Kurniati & Susilowati, 2019). This strength is further reinforced by the integration of local knowledge and institutional support, enabling MSMEs to remain competitive in global markets, while targeted national policies enhance their international bargaining position (Harikesa, 2020; Hatammimi & Gunawan, 2023). In addition, the implementation of green marketing strategies plays a crucial role in facilitating international market entry, as eco-friendly positioning, sustainability labeling, and consumer education help build brand credibility and differentiation (Badhwar et al., 2024; Putra, 2024). By aligning business practices with sustainability values, MSMEs can also attract environmentally conscious consumers, investors, and trade partners in global markets (Qiong & Hanafiah, 2023; Cui et al., 2025).

#### **4.2. Barriers to Eco-Print Batik Export**

The primary barrier to the internationalization of eco-print batik lies in strict regulatory compliance and international certification standards. Many MSMEs face difficulties in meeting complex technical export requirements, including the standardization of natural dye safety and eco-friendly labeling (Firdaus et al., 2025; Masril & Suparman, 2025). A lack of access to information regarding trade regulations in destination countries often results in product rejections at borders. Furthermore, the high costs associated with obtaining international certifications impose a significant financial burden on micro and small-scale enterprises (Francioni et al., 2016; Kunjuran et al., 2025).

Logistical inefficiencies and low market awareness regarding specific Indonesian product branding remain persistent challenges. Fluctuating international shipping costs and long distribution chains reduce the price competitiveness of products in target markets (Centobelli et al., 2022; Masril & Suparman, 2025). Although eco-print products possess high artistic value, weak brand identity recognition at a global level means Indonesian products often struggle to compete with similar offerings from other countries (Karmagatri et al., 2024; Karsinah et al., 2025). Without adequate logistical efficiency, the speed of response to global market trends is significantly hindered (Massa et al., 2023).

Constraints in production efficiency and quality standardization also impede the fulfillment of large-volume export demands. Time-consuming manual production techniques result in limited MSME production capacity for meeting international-scale orders (Rahayu & Peng, 2020). The absence of standardized sustainability measurement indicators often leads to inconsistent product quality between production batches (Nugroho et al., 2022). The limited availability of natural raw materials during certain seasons poses an operational risk that can disrupt supply continuity to foreign markets (Kusumastuti et al., 2023; Syafril & Agel, 2024).

Aggressive global competition from batik producers in other countries and the threat of greenwashing practices further complicate the market position of eco-print batik. Countries such as China and Malaysia often offer textile products with similar motifs at much lower prices through mass production processes (Gatut & Aryanto, 2010; Marganus, 2021). The prevalence of inauthentic eco-friendly claims (greenwashing) in the global fashion industry creates skepticism among consumers (Badhwar et al., 2024; Cui et al., 2025). This requires eco-print batik MSMEs to work harder to validate their sustainability claims through supply chain transparency (Centobelli et al., 2022; Öndoğan et al., 2022).

### **4.3. Eco-Print Opportunities in the Global Market**

Future opportunities for eco-print batik internationalization are strongly driven by a global lifestyle shift toward eco-art, eco-fashion, and sustainable living (Salma & Ristiani, 2021). Growing global awareness of global warming has triggered a surge in demand for eco-friendly textiles that utilize natural dyes as substitutes for synthetic ones (Martuti et al., 2020). Market research indicates that approximately 66% of millennials are willing to pay more for sustainable brands, with export potential valued significantly higher for nature-based creative products (Putra, 2024). Furthermore, batik export values reaching hundreds of millions of USD demonstrate that international markets, particularly Japan, the United States, and European countries, remain wide open for innovative products such as eco-print (Nugroho et al., 2022; Krisnaresanti et al., 2025).

Green marketing strategies are the primary key to winning the hearts of global consumers who are now highly attentive to eco-friendly and sustainability claims (Putra, 2024). International consumers tend to be more interested in the narrative behind eco-friendly production processes, where education regarding organic materials can significantly increase purchase intention (Sunarjo et al., 2021). Studies show that the majority of consumers are willing to purchase natural dye products within a competitive price range in the global market, provided that design quality and color durability are maintained. Product diversification into the home décor sector also opens new opportunities in the European market, as heritage-based craft products are considered to possess unique luxury and exotic value (Krisnaresanti et al., 2025).

Digital transformation and advanced technology adoption play a crucial role in enhancing the international competitiveness of eco-print batik MSMEs by improving efficiency, market reach, and product quality (Krisnaresanti et al., 2025). Digital marketing tools, such as live streaming and global marketplaces, enable broader market access without geographical limitations, while technologies like automated steam engines help ensure consistency in natural dye quality (Ayuni et al., 2024; Wulandari et al., 2025). Innovation that integrates traditional motifs with modern designs is essential to compete with mass-produced textiles (Poon, 2020). Moving forward, compliance with international environmental standards and the adoption of circular economy principles are critical for overcoming global market barriers (Nugroho et al., 2022; Firdaus et al., 2025). The implementation of sustainability certifications, clean production practices, and cross-sector collaboration not only strengthens stakeholder trust but also enhances efficiency, positioning eco-print batik as a competitive player in the global sustainable fashion industry (Martuti et al., 2020; Masril & Suparman, 2025).

## **5. Discussion**

The findings of this study confirm that the internationalization of eco-print batik MSMEs is shaped by a dynamic interaction between internal capabilities and external institutional pressures, as emphasized in the Resource-Based View (RBV) and Institution-Based View (IBV). From an RBV perspective, the results highlight that unique internal resources, such as artisan skills, natural dyeing techniques, and cultural authenticity, serve as key drivers of competitive advantage in global markets. This aligns with prior studies indicating that knowledge-based resources and intellectual capital are difficult to imitate and thus strengthen MSME competitiveness (Kurniati & Susilowati, 2019). The empirical findings further reinforce that the ability to transform biodiversity into high-value products enables eco-print batik to penetrate premium market segments, supporting earlier arguments by Steelyana (2012) and Hamdani (2018).

However, internal strengths alone are insufficient without alignment with external institutional frameworks. The identified barriers, such as complex export

regulations, certification requirements, and logistical inefficiencies, strongly support the IBV argument that formal and informal institutions significantly shape firm behavior (Kurniati & Susilowati, 2019; Masril & Suparman, 2025). Consistent with previous research, regulatory compliance and environmental certification remain major constraints for MSMEs attempting to enter international markets (Francioni et al., 2016; Kunjuraman et al., 2025). This indicates that successful internationalization requires not only resource optimization but also institutional adaptability, particularly in meeting global sustainability standards.

At the middle-theory level, the findings demonstrate that both gradual and accelerated internationalization pathways coexist among eco-print batik MSMEs. The Uppsala Model is reflected in the incremental development of export capabilities through increased market knowledge and digital adaptation (Dabić et al., 2019). At the same time, the significant role of digital marketing and global platforms supports the Born Global perspective, where MSMEs can rapidly access international markets through technological innovation (Francioni et al., 2016; He & Karami, 2016). Empirical evidence from Wulandari et al. (2025) and Krisnaresanti et al. (2025) confirms that digital literacy and tools such as live streaming substantially expand market reach, illustrating how technology compresses traditional internationalization stages.

Furthermore, Network Theory is strongly validated by the findings that collaboration and international linkages are essential for overcoming resource limitations. Strategic partnerships with designers, marketplaces, and trade networks enable MSMEs to access market information and reduce transaction costs, consistent with prior studies (Dabić et al., 2019; Massa et al., 2023). This supports the argument that relational capital is a critical enabler of export success, particularly for micro-scale enterprises with limited independent capacity.

From an applied perspective, Green Marketing Theory plays a central role in shaping global competitiveness. The results show that environmental awareness significantly influences consumer purchase intention, confirming earlier findings that sustainability positioning enhances brand value (Sunarjo et al., 2021; Cui et al., 2025). The effectiveness of eco-certification in facilitating market entry, as identified by Putra (2024), further demonstrates the importance of credible sustainability claims in avoiding consumer skepticism and greenwashing concerns.

The integration of circular economy principles and digital innovation underscores the emergence of eco-print batik as a form of enviropreneurship. By combining environmental responsibility with technological adaptation, MSMEs can achieve not only economic gains but also social and ecological value, consistent with the Triple Bottom Line framework (Centobelli et al., 2022). These findings suggest that the sustainable internationalization of eco-print batik depends on a holistic strategy that integrates resource optimization, institutional compliance, technological innovation, and collaborative networks.

## 6. Conclusion

This study finds that the internationalization of Indonesian eco-print batik is driven by the synergy between global environmental awareness and digital transformation, enabling access to premium markets such as Switzerland, France, and the United States. Clean production practices improve sustainability while reducing costs, and digital marketing innovations play a key role in enhancing export performance. The study also highlights digital literacy and green leadership as strategic assets for MSME competitiveness. It emphasizes the need for production automation, transparent supply chains, and standardized sustainability certifications. Beyond economic gains, the eco-print batik industry contributes to social welfare by supporting artisan communities in line with sustainable development goals.

This study has several limitations. The use of only 12 PRISMA-selected articles limits the breadth and generalizability of findings, while reliance on secondary data may not fully capture dynamic changes in digital adoption, market trends, and regulations. In addition, variations in methods and indicators across studies may affect the consistency of the synthesis. Future research should incorporate primary data (surveys or case studies of batik MSMEs), apply longitudinal approaches to assess long-term impacts, and develop standardized sustainability indicators. Expanding cross-country comparisons would also strengthen insights into global competitiveness.

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### ***Data Disclosure Statement***

The data that support the findings of this study are available from the corresponding author upon reasonable request.



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