ECO-PRINT AMONG URBAN MUSLIM BATIK ARTISANS IN PEKALONGAN: RECONSTRUCTING ENVIRONMENTAL ETHICS AND SUSTAINABILITY THROUGH THE PERSPECTIVE OF SEYYED HOSSEIN NASR

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Abstract
Pekalongan, known as the World City of Batik, has seen eco-print emerge among batik artisans as a response to persistent liquid-waste problems in its creative economy. However, adoption remains limited, raising questions about the practice's sustainability. This study aims to analyze the resistance to eco-print among batik artisans and to reconstruct environmental ethics based on Seyyed Hossein Nasr's thought. Using a meta-epistemological and conceptual approach, data were collected through interviews and observations with nine batik industry practitioners in Pekalongan, including those who have fully adopted, limitedly produced, discontinued, or only known eco-print, combined with a systematic literature review; empirical data were analyzed thematically and read against Nasr's conceptual framework. Findings show that artisans reject or limit eco-print adoption because acceptance is heavily negotiated against production experience, labor availability, time, weather conditions, raw material constraints, and market demand, alongside a cultural criterion where all practitioners distinguish eco-print from traditional batik based on the absence of liquid wax, while sustainability is largely framed by artisans/industry through technical operational feasibility rather than ethical considerations. These patterns illustrate, at the meta-epistemological level, a tension between traditional knowledge systems and modern ecological rationality, in which sustainability remains anthropocentric and technically driven. Drawing on this tension, the study proposes an Islamic environmental ethics grounded in *tawāzun* (balance) and *amānah* (moral responsibility), operationalized as a holistic evaluation framework that reconciles ecological consequences with local knowledge, economic viability, workforce capacity, and cultural identity without eroding the heritage status of batik. This study contributes to environmental ethics discourse by offering an empirically grounded, non-normative framework for Islamic sustainability in craft industries, while

acknowledging that its claims are limited to the Pekalongan batik context and require further empirical testing in other settings

Keywords: batik industry; eco-print; environmental ethic; meta-epistemology

A. Introduction

The batik industry in Pekalongan, which bears the tagline 'The World City of Batik', makes a significant contribution to the local economy (Ferdiansyah & Abadi, 2023; Wardoyo & Prihatini, 2024). However, liquid waste from the batik production process is often discharged directly into rivers without adequate treatment (Baihaqi et al., 2024), resulting in water pollution characterised by discolouration, unpleasant odours, declining water quality, and the presence of hazardous chemicals such as synthetic dyes and heavy metals, thereby threatening aquatic ecosystems and the health of the surrounding community (Safamaura & Afany, 2025; Apriyani, 2018). The impacts of this pollution are often clearly visible, such as the phenomenon of 'red floods' caused by floodwater mixing with batik waste (Alfiqri, 2021). This issue has long been a concern for the government and the local community, leading to various studies on waste management strategies to ensure the sustainability of the batik industry (Ragil et al., 2023), one of which involves replacing synthetic dyes with natural dyes through eco-print production (Hikmah & Retnasari, 2021; Faridatun, 2022). Nevertheless, the extent to which this solution has actually been accepted and widely adopted by Pekalongan batik artisans remains a question that has yet to be fully answered.

Eco-print is a fabric-dyeing technique that utilises natural materials such as leaves, flowers and plant stems to produce patterns and colours on textiles without the use of synthetic dyes (Faridatun, 2022). This method is considered more environmentally friendly than synthetic dyes and has the potential to support the sustainability of the textile industry through the use of biodegradable materials (Afrahamiryano et al., 2022; Pitri et al., 2023), whilst also enhancing the aesthetic value and competitiveness of batik products (Anwar et al., 2023; Hikmah & Retnasari, 2021). However, the claim that eco-printing is environmentally friendly is not entirely free from technical issues. The eco-print process generally still requires metal-based fixatives or mordants, such as alum and ferrous sulphate, to set the colour and improve the fabric's colourfastness, which may in turn cause environmental impacts of its own (Budiman & Astuti, 2026). Without mordants, natural dyeing tends to result in low colourfastness and inconsistent outcomes. Consequently, the extent to which eco-printing genuinely reduces waste compared to synthetic batik still requires more specific comparative studies, given that the application of eco-printing in the Pekalongan batik industry (Hikmah & Retnasari, 2021) has so far been promoted primarily for its environmental benefits without being accompanied by an empirical evaluation of waste characteristics.

Specific data on the number of batik businesses in Pekalongan that have adopted eco-printing techniques is not yet publicly available. However, the Pekalongan City Council is actively promoting the adoption of eco-printing techniques amongst small and medium-sized enterprises (SMEs) (PUBLIK, 2024). Through the Department of Industry and Labour (Dinperinaker), eco-print training has been organised to improve the skills of SME operators in using environmentally friendly materials for textile dyeing (Dinperinaker, 2024; Kutnadi & Susilo, 2024). Eco-printing has also been introduced in schools to foster children's creativity (Marfuah et al., 2023). Furthermore, the Pekalongan City Regional National Crafts Council (Dekranasda), in collaboration

with the Department of Trade, Cooperatives, and Small and Medium Enterprises (Dindagkop UKM), has also organised eco-print batik training as an effort to reduce batik waste and develop new business opportunities for MSME practitioners and beginners alike (PUBLIK, 2021). A study on the empowerment of batik SMEs in Kampung Batik Kemplong, Pekalongan (Wardoyo & Prihatini, 2024), for example, identified barriers such as limited capital, low participation among the younger generation, and the length of the natural dyeing process — yet it did not address how artisans interpret and accept knowledge regarding natural dyeing innovations themselves. Consequently, the various training and empowerment programmes that have been implemented have tended to focus on technical and economic skills, whilst the epistemological dimensions underlying artisans' acceptance or rejection of eco-printing have received little attention.

Accordingly, our earlier study of nine batik industries in six batik centers in the city of Pekalongan—Kampung Batik Kauman, Jetayu, Dekoro, Tirto, Pesindon, and Krapyak (Inayati et al., 2025)—found that the low uptake of eco-printing among artisans is related to the construction and distribution of knowledge rather than just skill, cost, batik identity, or government policy. Eco-print fabrics are not regarded as "batik because they don't meet the technical and historical standards that artisans have internalised. These results support the epistemic nature of the eco-print adoption problem in Pekalongan. The study reveals tensions within the knowledge system and calls for the need for 'epistemic negotiation' that values local knowledge; however, it has not yet formulated an ethical-normative framework that could serve as a concrete basis for such negotiation. This article provides a theoretical exploration of the research findings, analysing them through Seyyed Hossein Nasr's framework of environmental epistemology in order to formulate an ethical proposal for the sustainable production of eco-prints amongst Pekalongan batik artisans.

Further examination of this epistemic tension should focus on the questions of why these differences in knowledge systems exist and how they can be reconciled. The finding that the concept of sustainability among artisans is understood more pragmatically—for example, as exemplified by the existence of a Wastewater Treatment Plant (WWTP)—rather than as a comprehensive ecological consciousness, indicates a fundamental tension between instrumental modern rationality and traditional knowledge systems that are more contextual and meaningful to artisans. When ecological innovations such as eco-print are introduced through a framework that tends to be technocratic and top-down, without taking into account the cultural dimensions and meanings that are alive within the artisan community, what results is not transformation but resistance—as demonstrated by the artisans' refusal to recognize eco-print as part of batik itself.

According to Seyyed Hossein Nasr (Nasr, 1990, 2007; Sayem, 2019a, 2019b), environmental problems are not merely technical in nature but are rooted in a modern epistemological crisis that separates humans from the sacred dimension of nature. In the context of the batik industry, the dominance of instrumental rationality in understanding sustainability reduces eco-print to a mere technological solution rather than an ethical transformation. Unlike our earlier study (Inayati et al., 2025), which empirically identified the knowledge constructions and epistemic tensions among artisans through a phenomenological and pragmatic approach, this article aims to further examine those findings as a conceptual elaboration through Nasr's environmental epistemology—specifically the principles of cosmic unity, balance (*tawāzun*), and humanity's moral responsibility (*amānah*) toward nature—in order to reconstruct an environmental ethics

framework grounded in Islamic epistemology that can serve as a normative basis for the sustainable production of eco-prints among Pekalongan batik artisans

B. Methods

This article is a conceptual elaboration of the findings of field research previously conducted by a research team in the Pekalongan batik industry (Inayati et al., 2025); the primary and secondary data were sourced from that study and were not re-collected, rather, they were further analysed through Seyyed Hossein Nasr's environmental epistemology as a new conceptual contribution. The original research employed a qualitative approach grounded in the philosophies of phenomenology and pragmatism within a meta-epistemological framework (Negou et al., 2023). Here, meta-epistimology is defined as an endeavour to examine how knowledge about eco-print is constructed, validated, and contested amongst different knowledge systems, the local epistemology of conventional batik (which requires the use of liquid wax as a marker of authenticity) is pitted against the new knowledge introduced by eco-print. Operationally, this study is conducted in three stages: (1) a conceptual analysis of the definitions and principles of eco-print, (2) an analysis of the construction of knowledge regarding how eco-print is interpreted and disseminated amongst industry practitioners, and (3) a meta-epistemological analysis of the assumptions and tensions underpinning the acceptance or rejection of eco-print as a sustainability solution.

Table 1. Research Informants in the Urban Muslims Batik Industry

No.	Industry Name	Area / Region	Type of Batik
1	Griya Batik Mas	Kauman	Hand-drawn, stamped, combination
2	Bella Batik	Kauman	Hand-drawn, stamped, combination
3	Batik Bulan	Jetayu	Hand-drawn, stamped, combination
4	Batik Humam	Dekoro	Hand-drawn, stamped, combination
5	Batik Zamas	Tirto	Hand-drawn, stamped, combination
6	Batik Awee	Tirto	Stamped
7	Batik Larissa	Pesindon	Hand-drawn, stamped
8	Batik Ardi's	Pesindon	Hand-drawn, stamped
9	Kraka Ecoprint	Krapyak	Eco-print

The research was conducted in six batik centres in the city of Pekalongan (Table 1), involving 11 informants from nine batik businesses selected through purposive sampling based on criteria of business activity and diversity of production techniques (hand-drawn, stamped, combined, and eco-print); eight businesses were each represented by one informant, whilst Griya Batik Mas was represented by three informants (the owner and craftspeople) to capture potential differences in perspective within a single business unit. Primary data collection took place over approximately four months (within a total research period of approximately one year) through semi-structured interviews (approximately one hour per informant), participatory observation of the production process, and documentation. Secondary data were obtained through a systematic literature review of relevant books, conference proceedings, national and international journal articles, and government/research reports, using the Google Scholar, Garuda and Scopus databases with keywords such

as 'eco-print', 'Pekalongan batik', 'batik waste', 'meta-epistemology' and 'adoption of environmentally friendly innovations.'

Primary data were analyzed inductively to identify themes relating to crafts people's knowledge construction regarding batik and eco-print, whilst secondary data were analyzed through a systematic literature review following the three stages of analysis outlined above. The validity of the primary data was strengthened through source triangulation, comparing statements between informants across regions and business scales, for example, differing views on the primary source of waste pollution (large-scale textile industries versus home-based industries), in order to understand epistemic diversity, rather than as mutually exclusive findings. As a conceptual elaboration, the identified epistemic themes. Particularly the reluctance of some craftspeople to recognize eco-print as 'batik' and a pragmatic understanding of sustainability (represented by the presence of wastewater treatment plants), were reinterpreted through Nasr's three categories of environmental epistemology: cosmic unity, balance (*tawāzun*), and moral responsibility (*amānah*) in order to formulate an Islamic epistemology-based environmental ethical framework for the sustainable production of eco-prints.

C. Findings and Discussion

1. Findings

Epistemic Constructions of Batik and Eco-printing in the Urban Muslim Artisans' Community

Among the nine batik businesses that served as research informants (Table 1), variations in the level of eco-print adoption were identified, forming a spectrum. At one end of the spectrum, Kraka Eco-print is the only business that has fully focused its production on eco-print since 2018, beginning with independent experiments by its owner, Lyla, without any formal training. In the middle of the spectrum, Batik Ardi's had attempted to produce eco-print but ceased doing so because the selling price was considered low and there was little market demand, whilst Batik Bulan continues to produce eco-print on a very small scale as a by-product alongside its main production of hand-drawn, stamped and printed batik. At the other end of the spectrum, the majority of informants, Griya Batik Mas, Bella Batik, Batik Humam, Batik Larissa and Batik Zamas, are familiar with the concept of eco-print but have never developed it, whilst Batik Awee is completely unfamiliar with this technique. The data also shows that most of these businesses admit that they have never received eco-print orders from customers, which indicates that market demand for this technique in Pekalongan remains limited.

The research findings indicate a consensus amongst all informants — including Lyla, the owner of Kraka Ecoprint, which produces eco-prints exclusively — that fabric produced without using a wax base cannot be termed 'batik', but rather 'fabric with a batik pattern'. Lyla expressed this view directly:

'Eco-print is not batik. This is something that needs to be properly understood. Batik requires the use of wax, whereas eco-print does not use wax. Instead, it involves a technique of pressing leaves onto the fabric, then tying it tightly and boiling it, or by pounding the leaves against the back of the fabric.' (Lyla, owner of Kraka Ecoprint)

The consistency of this view amongst all informants, including those practitioners who have, in fact, fully adopted eco-print. This indicates that the criterion of using *malam* as the determining factor for the authenticity of 'batik' is widely upheld, regardless of the informants' attitudes towards eco-print itself. Among informants who have not yet adopted eco-print, the most frequently cited reasons relate to limitations in

human resources, production time, and its suitability for market demands. Hisyam, the owner of Griya Batik Mas, explained the shortage of specialised labour:

'*As for developing eco-print, we don't yet have the workforce, as it requires specialised skills. Our current workforce is already focused on fulfilling local orders and, where applicable, orders from other regions or nationwide.*'

Meanwhile, Ace, a batik artist in the same industry, highlighted the dependence of the eco-printing process on weather conditions and its implications for production deadlines:

'Ecoprint takes a long time and requires hot weather. If it rains, we won't be able to do it, and that would be a shame for our customers. Orders are usually for uniforms to be worn at specific events, such as weddings. If we use ecoprint, we clearly won't be able to meet our deadlines.'

In addition to these two factors, other informants also cited the limited availability of raw materials, certain types of leaves and flowers that are difficult to find in the local area, as well as the cost of natural dyes, which are generally more expensive than synthetic dyes as further considerations in their decision not to develop eco-printing yet.

Field data also indicate that industry players' understanding of sustainability and environmental pollution varies and tends to be interpreted pragmatically. There is a difference of opinion between Qonita from Griya Batik Mas and Wati from Batik Bella regarding the main source of waste pollution in Pekalongan: Qonita considers the large-scale jeans industry to be the largest contributor to waste due to the massive use of synthetic dyes and the large number of factories operating without wastewater treatment plants (IPAL), whilst Wati considers the numerous and widely dispersed home-based batik industries to be the largest cumulative source of waste, given that the vast majority of these home-based businesses lack waste treatment facilities. Despite these differing views, the findings indicate that sustainability efforts have been undertaken by some industry players, such as Griya Batik Mas, Bella Batik and Batik Bulan, which have installed WWTPs or simple filtration systems, as well as two businesses; Batik Ozzy and Griya Batik Mas, that have obtained Green Batik Industry Certification from the Department of the Environment. These efforts are generally reflected in the possession of infrastructure or formal certification, rather than through substantial changes in the selection of raw materials or the production techniques themselves

2. Discussion

a. The Construction of Knowledge about Eco-print in the Batik Industry

The construction of knowledge regarding eco-print in the Pekalongan batik industry can be understood through the ways in which industry practitioners recognize, evaluate, and assign meaning to this technique based on their production experiences. Research data from nine businesses indicate that knowledge of eco-print is not uniformly distributed. Kraka Ecoprint has made eco-print the primary focus of its production since 2018 through the self-directed learning of its owner, Lyla, without formal training. In contrast, Batik Bulan produces it only on a limited scale as a byproduct, while Batik Ardi's once attempted to produce it but later discontinued it because the selling price and market interest were deemed insufficient. Griya Batik Mas, Bella Batik, Batik Humam, Batik Larissa, and Batik Zamas are familiar with eco-print but have not yet developed it, while Batik Awee is not even familiar with the technique (Inayati et al., 2025). This pattern indicates that awareness of eco-print has not yet led to the same level of acceptance. Thus, the status of eco-print knowledge within the batik industry community cannot be determined solely by the presence or absence of information about the technique, but also by experience, perceived benefits,

compatibility with production practices, and market acceptance.

This distinction became clearer when the informants were asked to classify eco-print within the category of batik. All informants, including Lyla, who produces eco-print exclusively, distinguished eco-print from batik based on the use of wax. Lyla explained;

"Eco-print isn't batik. This is something that must be clearly understood. Batik must use wax, whereas eco-print does not use wax."

This statement indicates that wax use serves as a categorical criterion for distinguishing batik from other production techniques. Thus, within the studied community, knowledge of batik relates not only to the visual outcome—the motifs on the fabric—but also to the production process that practitioners have historically and practically known. This finding is significant because it demonstrates that the acceptance of a new technique must confront an already established category of knowledge. Eco-print can be recognised and practised, but such recognition does not automatically alter the conceptual boundaries that define batik.

From a phenomenological perspective, these findings can be interpreted as part of the lifeworld, which is the world of experience that serves as the backdrop for the formation of meaning before an object is reflectively constructed as knowledge. For batik artisans who work daily with the canting, wax, dyeing, wax removal, and fabric finishing processes, "batik" exists not merely as a technical term but as a recurring and collectively recognized production experience. Therefore, when eco-print was introduced as a distinct technique, the artisans did not evaluate it in a vacuum (Inayati et al., 2025). Instead, they compared this technique to their existing experiences regarding how batik is made, how its quality is assessed, and how the product is marketed. Within Husserl's framework (Husserl, 2001), such experiences can be understood as the foundation for the formation of meaning before an object is assigned a specific categorization. Thus, the distinction between eco-print and batik identified in this study is not merely a matter of terminology but demonstrates how repetitive production experiences shape the horizon of consciousness within which the new technique is evaluated.

This perspective is also evident in how informants assess the practical benefits of eco-print. For some practitioners, eco-print has characteristics that differ from hand-drawn and stamped batik, but these differences are not automatically seen as a reason to change their primary production practices. Batik Bulan, for example, continues to treat eco-print as a byproduct, while Batik Ardi's has halted its production because the selling price and market interest were deemed insufficient. At Griya Batik Mas, Hisyam explained that the development of eco-print is hindered by a lack of specialized labor, as the available workforce is already dedicated to fulfilling orders. Ace added that the eco-print process requires specific time frames and weather conditions, which could potentially make it difficult to meet order deadlines (Inayati et al., 2025). These findings indicate that the criteria for accepting eco-print among practitioners are shaped not only by whether the technique is feasible but also by whether it can be integrated into existing production systems. At this stage, knowledge of eco-print is negotiated through practical experience rather than accepted merely because of its status as a new technique.

These findings align with John Dewey's pragmatic perspective, which views knowledge as the result of inquiry into concrete problems (Dewey, 1905). Knowledge gains meaning through a process of trying, experiencing consequences, evaluating results, and adjusting actions. Kraka Ecoprint's experience demonstrates a form of inquiry distinct from that of other industries. Lyla began eco-printing through

independent experimentation and later made it the focus of her production. In contrast, Batik Ardi's halted its experiments after considering market value and consumer response. Batik Bulan maintains eco-printing on a small scale, while other industries have not yet developed it due to considerations of production capacity and market demand. These differences indicate that eco-print is in a process of practical testing that yields different consequences for each actor. In Dewey's terms, these differing decisions do not merely reflect varying levels of knowledge but demonstrate how knowledge is shaped through the interaction between experience and the real-world challenges faced by each actor.

When these patterns are compared across informants, there are at least three criteria that appear to recur in the process of accepting eco-print: consistency with production experience, economic and market viability, and the technique's ability to meet operational needs. The first criterion is evident in the widespread use of wax as a distinguishing feature between batik and eco-print. The second criterion is evident in Batik Ardi's decision to cease production due to considerations of resale value and market demand. The third criterion is evident in Hisyam and Ace's explanations regarding labor, production time, and dependence on weather conditions. Given these criteria, the statement that eco-print is 'not yet legitimate' must be understood in a limited sense: it does not mean that eco-print is not recognized at all as knowledge or lacks validity, but rather that it has not yet attained the same legitimacy as the established batik production knowledge within the informants' community. Indicators of this can be seen in the fact that eco-print is still treated as a technique distinct from batik, has not yet become the primary practice for most informants, and is still assessed in terms of market viability and production capacity.

This construction of legitimacy also demonstrates that experience plays a crucial role in determining who or what is trusted as a source of knowledge. In the case of Kraka Eco -print, knowledge was not acquired through formal training, but through independent experimentation which has since been put into practice in sustainable production since 2018. This shows that new knowledge can emerge from individual experience, but the sustainability of that knowledge within the community remains linked to its ability to gain practical acceptance. Conversely, for most informants, a lack of direct experience with eco-printing means that this knowledge has not yet become part of their production routine. Therefore, the research data is not yet sufficient to assert the existence of 'local epistemic authority' in the sense of a formal structure that determines the validity of knowledge. However, the data indicate the existence of a validation mechanism based on experience and practice: a technique is more readily accepted when it has been tried and tested, is feasible, meets production needs, and yields value deemed adequate.

This study does not directly measure the gap between 'modern epistemology' and 'local epistemology', but it does identify differences in the criteria used to assess eco-print. On the one hand, eco-print is presented as a technique distinct from the conventional batik-making process; on the other hand, the informant community assesses its status through the category of batik, which has been shaped by their experience of using wax, their production capabilities, and market demands. Thus, the epistemic gap in this study refers to the discrepancy between the way eco-print is categorized as a production technique and the way batik communities determine the production knowledge relevant to their identity and the sustainability of their businesses. This concept is an interpretation of the data patterns, not an assumption made prior to the research.

This finding also corrects the tendency to assume that the adoption of

technologies or production techniques related to sustainability is primarily determined by the level of environmental awareness. The research data shows that ecological considerations are not the only factor, nor are they always the primary consideration in adoption decisions. When informants explained why they had not yet developed eco-print, the reasons cited were primarily related to labor, time, weather, raw materials, price and market demand. It is therefore premature to conclude from this data that industry practitioners reject eco-print due to a lack of environmental awareness. Similarly, it is not accurate to state that eco-print is accepted solely because of its ecological advantages. A more reliable finding is that the meaning and acceptance of eco-print are shaped through a negotiation between the identity of batik, production experience, economic viability, and the operational conditions of the industry.

Dewey's perspective reinforces this interpretation because inquiry does not take place in a theoretical space, but rather in concrete problematic situations (Dewey, 1905). In this study, such a problematic situation arises when practitioners must consider the possibility of new techniques without neglecting the continuity of ongoing production. Kraka Eco-print demonstrates that experimentation can evolve into a primary practice when practitioners discover a form of production that aligns with their experience and business orientation. Batik Ardi's illustrates the opposite possibility: when experiments do not yield economic value deemed sufficient, the technique is abandoned. Batik Bulan occupies a middle ground between the two through limited-scale eco-print production. These variations demonstrate that the construction of eco-print knowledge unfolds as an open-ended and ongoing process. Its practical validity is continually negotiated through production experiences and responses to market conditions.

Thus, this study does not position eco-print from the outset as a more accurate, more ecological, or more advanced form of knowledge compared to conventional batik. This stance is important because the ecological status of a production technique cannot be determined solely based on the characteristics of the materials or the manufacturing procedures without considering evidence regarding resource use, waste, energy, the life cycle of materials, and the overall consequences of production. In this study, the available empirical data primarily explain how practitioners interpret and evaluate eco-print, rather than measuring its ecological impact comparatively. Therefore, discussions regarding the environmental advantages of eco-print must be limited to what is known and claimed by informants or supported by prior research, rather than being treated as empirical conclusions of this study. This limitation strengthens the analysis because the focus of the research becomes clear: to uncover the socio-epistemic processes that determine how a new technique is accepted, negotiated, or remains outside established categories of knowledge.

Based on the overall findings, the construction of knowledge about eco-print in the Pekalongan batik industry can be formulated as a process that unfolds across three layers. First, the experiential layer, which refers to how practitioners come to know and directly experience the eco-print technique. Second, the practical evaluation layer, which refers to how the technique is assessed in terms of labor, time, raw materials, cost, and market demand. Third, the layer of cultural categorization, which refers to how eco-print is situated in relation to the definition of batik that has been shaped through the experience of using wax. These three layers demonstrate that knowledge does not merely transfer from external sources to industry practitioners but undergoes a process of selection and reinterpretation within the community's lifeworld. From a phenomenological perspective, this process reveals how experience shapes the horizon of meaning; whereas from Dewey's perspective, it demonstrates how knowledge is

tested through its practical consequences (Dewey, 1905; Riga, 2020). Thus, the research findings lead to the understanding that the acceptance of eco-print is not a simple matter of accepting or rejecting an innovation, but rather a process of knowledge construction that brings together experience, cultural identity, economic needs, and the potential for changes in production practices.

b. Reconstructing Environmental Ethics in the Batik Industry of Urban Muslims Community Based on the Thought of Seyyed Hossein Nasr

The research findings indicate that the adoption of eco-printing among the Pekalongan batik industry has not yet become a dominant practice; rather, it falls along a spectrum ranging from full adoption, limited adoption, discontinuation of trials, to no adoption at all. Of the nine informants, only Kraka Ecoprint has fully focused its production on eco-print, while Batik Bulan still produces it on a limited scale and Batik Ardi's had tried it but later discontinued it. Meanwhile, most of the other informants are familiar with eco-print but have not yet developed it; in fact, Batik Awee is not even familiar with the technique (Inayati et al., 2025). This situation indicates that awareness of production practices perceived as more environmentally friendly does not automatically lead to a decision to adopt them. Such decisions are shaped by the interplay of producers' knowledge, production capacity, market demand, resource availability, and economic considerations. Thus, the issue of sustainability in the batik industry cannot be understood merely as a matter of choosing production technologies, but also as a matter of how producers interpret, evaluate, and integrate ecological knowledge into their production decision-making processes.

The limitations on adoption are evident from the reasons cited by the informants. Hisyam from Griya Batik Mas, for example, explained that the development of eco-print is hampered by the lack of specialized labor, as the existing workforce has been assigned to fulfill orders. Ace also highlighted the eco-print process's dependence on weather conditions, which could potentially hinder meeting production deadlines. Other informants raised issues regarding the availability of raw materials and the relatively higher prices of natural dyes. On the market side, Batik Ardi's halted eco-print production because the selling price and market interest were deemed insufficient, while the majority of informants had never received eco-print orders from customers. These findings reveal a tension between ecological orientation and the prevailing production rationality within the batik industry. Practices considered more environmentally friendly must contend with demands for timeliness, labor efficiency, material availability, cost, and consumer demand (Inayati et al., 2025). Therefore, the low adoption of eco-print cannot be directly interpreted as a lack of environmental awareness among industry actors but must be understood as the result of the interplay between ecological orientation and the material and economic conditions of production (Sunarti, et al, 2026).

This tension becomes even more complex when examined in relation to industry practitioners' constructions of the meaning of "batik." All informants, including Lyla who produces exclusively eco-print, distinguish eco-print from batik based on the use of wax. Lyla explicitly states that eco-print is not batik because it does not use wax. Rather, it is a technique for creating patterns by applying or pounding plant materials onto fabric. This finding suggests that the boundary between batik and eco-print is not solely defined by the visual characteristics of the product, but also by practical knowledge regarding the production techniques considered to shape the identity of batik. Thus, eco-print occupies a unique position: it is accepted as an alternative production technique with a specific ecological orientation, yet it has not yet gained

categorical legitimacy as batik (Inayati et al., 2025). This finding is significant because it shows that the transition toward more sustainable practices does not always occur through the replacement of old techniques with new ones. The transition must also engage with local knowledge, cultural identity, and categories that are deeply rooted within the production community.

This framework can be understood through Seyyed Hossein Nasr's thoughts on the relationship between the ecological crisis and the way humans understand nature and knowledge. Nasr views the environmental crisis not merely because of technical damage, but also as linked to a worldview that regards nature primarily as an object of exploitation. Nasr's critique of materialism and scientism highlights the tendency to separate knowledge from its ethical and spiritual dimensions (Nasr, 1990, 2007). In the context of this study's findings, this perspective helps explain that ecological issues in the batik industry do not lie solely in the presence or absence of environmentally friendly technology, but also in how knowledge regarding production, the economy, cultural identity, and the environment is situated within a single framework of consideration (Sauqi, et al, 2026). From this perspective, local knowledge about malam need not be positioned as an obstacle to sustainability, just as eco-print cannot automatically be regarded as a more ecological form of knowledge. Both must be understood in relation to their productive functions, cultural values, and ecological consequences. This context-dependence is illustrated by contrasting evidence from Bantul, where eco-print batik was readily accepted by textile artisans precisely because it aligned with an existing local tradition of natural dyeing and weaving (Syafril & Agel, 2024), unlike in Pekalongan, where the wax-based definition of batik constructs a categorical boundary that eco-print has yet to cross. This comparison suggests that the legitimacy of an ecological innovation is not an inherent property of the technique itself, but is contingent on its resonance with the pre-existing epistemic structure of a given craft community.

Findings regarding environmental management practices increasingly reveal a discrepancy between technical compliance and the internalization of ecological ethics. Griya Batik Mas, Bella Batik, and Batik Bulan have implemented waste management through wastewater treatment plants (IPAL) or simple filtration systems, while Batik Ozzy and Griya Batik Mas have obtained Green Batik Industry Certification from the Ministry of the Environment. These practices indicate that environmental considerations are present in industrial activities. However, the data also show that sustainability is more often represented by the presence of waste management infrastructure or formal certifications rather than fundamental changes in the selection of raw materials and production techniques. The differing perspectives between Qonita and Wati regarding the primary sources of pollution in Pekalongan also demonstrate that interpretations of ecological issues are not yet entirely uniform. Qonita highlights large-scale jeans manufacturing, while Wati emphasizes the accumulation of waste from small-scale batik workshops (Inayati et al., 2025). These findings suggest that environmental awareness has grown within industrial practices, but it has not always led to a shared understanding of the batik industry's role within the broader framework of ecological issues.

At this point, the concept of humanity as God's vicegerent in Nasr's thought provides an interpretive framework for understanding the need for such change. Humanity's position as Allah's vicegerent on earth (*khalifat Allah fi al-'ard*) entails not only a mandate to utilize nature but also a responsibility to maintain the order and balance of creation. Nature, in Nasr's view, is not reduced to a material object to be freely exploited but possesses a sacred dimension as signs (*ayat*) of God (Nasr, 2007).

When applied to the context of the batik industry, this framework shifts the question from simply "does the industry have a waste treatment system?" to "how do ecological consequences become part of the considerations when determining materials, techniques, processes, and production goals?" This shift is important because it allows sustainability to be understood not merely as the fulfillment of external standards, but as a value orientation that influences the decision-making process. Within this framework, the use of eco-print can be considered one alternative ecological practice, but not the sole indicator of success in environmental ethics.

Nasr's perspective on the critique of the dominance of technical knowledge also opens space for re-examining the role of local knowledge in the industrial transformation of batik (Nasr, 2007; Stella, 2026). The finding that practitioners continue to use wax as one of the primary hallmarks of batik indicates that sustainability cannot be achieved by disregarding local knowledge and identity. Rather, the reconstruction of environmental ethics must bring together local knowledge with new ecological knowledge (Haq, et al, 2023; Gbadegesin & Gbadamosi, 2024). The eco-print technique, for example, can serve as a learning space for utilizing natural materials and reducing dependence on specific substances, while batik-making knowledge remains a source of identity and cultural continuity. Thus, the reconstruction in question is not the replacement of old knowledge with new knowledge, but rather a reorganization of the relationships between different forms of knowledge so that ecological considerations can be integrated into production practices without severing the industry's connection to the cultural identity that has shaped it.

Based on the dialogue between the field findings and Nasr's ideas, this study posits that environmental ethics in the batik industry must be understood as an integration of production knowledge, cultural values, economic rationality, and ecological responsibility (Paidi, et al, 2026). This framework emerges from three main tensions identified in the study: first, between the ecological orientation of eco-print and the demands of production efficiency; second, between innovations in production techniques and the construction of batik identity based on liquid wax; and third, between environmental compliance through infrastructure or certification and substantive changes in production practices. These three tensions indicate that sustainability cannot be achieved merely by introducing new technologies or techniques. A shift is required in how practitioners connect their knowledge of production with ecological values and social responsibility. In the context of Nasr's thought, this shift can be understood as an effort to restore the dimensions of value and responsibility to knowledge and production practices, which have thus far tended to be separated by considerations of efficiency (Nasr, 2007).

Thus, the reconstruction of environmental ethics resulting from this study does not position eco-print as a substitute for batik, nor does it conclude that the use of eco-print is, in and of itself, an ethical form of production. Eco-print is more appropriately positioned as one of the practical spaces that allows practitioners to explore the integration of production innovation and ecological responsibility. The reconstruction of ethics lies, rather, in a shift in orientation. From sustainability understood primarily as waste management, infrastructure ownership, or meeting certification requirements, toward a sustainability that considers the relationship between what is produced, how production is carried out, what resources are used, and the ecological consequences that result. From Nasr's perspective (Nasr, 1990; Sayem, 2019), this orientation takes on a broader dimension because the relationship between humans and nature does not stop at instrumental considerations but is situated within the framework of human

responsibility as stewards. Therefore, the construction of environmental ethics in the batik industry proposed by this study can be formulated as the integration of ecological knowledge, local production wisdom, economic rationality, and spiritual responsibility into a single orientation of sustainable production.

D. Conclusion

This study shows that the construction of knowledge about eco-print among batik industry practitioners in Pekalongan varies considerably and has not resulted in uniform acceptance. Of the nine businesses examined, only Kraka Eco-print has made eco-print its primary production focus, while one produces it on a limited basis, another has tried it but discontinued it, and most of the others are familiar with the technique but have not developed it. Acceptance of eco-print is influenced by production experience, labour availability, time and weather conditions, raw materials, market value, and market demand. The study also found that all informants, including those who have fully adopted it, distinguish eco-print from batik on the basis of liquid wax use. This finding suggests that new knowledge is evaluated not only on its technical characteristics but also negotiated in relation to production experience and the cultural identity established within the Urban Muslim batik community.

Based on this pattern, the construction of knowledge about eco-print in this study is shaped by three interrelated dimensions: experience, practical consequences, and cultural categorization. Direct experience shapes practitioners' understanding of eco-print, while labour, time, raw materials, price, and market form the basis for evaluating the feasibility of this technique. At the same time, liquid wax use serves as a cultural criterion that delimits eco-print' position within the category of batik. From Husserl's perspective, this situation highlights the role of lived experience in meaning formation, whereas Dewey's perspective explains that acceptance of new knowledge occurs through testing and evaluating its practical consequences. Thus, eco-print within the industry under study has not yet become established production knowledge but remains in negotiation between experience, practical utility, and cultural identity.

From Seyyed Hossein Nasr's perspective, these findings can be interpreted as a need to broaden the orientation of knowledge production so that ecological considerations do not stop at technical aspects or formal compliance. However, this study does not suggest that spirituality automatically resolves ecological issues or that eco-printing is inherently a more ethical form of production. Nasr's interpretation provides a normative framework for situating the relationship among humans, production, and nature within a broader horizon of responsibility. Based on a dialogue between the empirical findings and this perspective, the reconstruction of environmental ethics in this study does not primarily involve replacing batik with eco-print but rather expanding the ways in which knowledge and production practices are evaluated so that ecological considerations can be reconciled with local knowledge, cultural identity, and economic viability. Thus, sustainability must be understood as an orientation that simultaneously considers what is produced, how production is carried out, what resources are used, and what ecological consequences result.

The implications of this study are that the development of sustainable production practices must consider the specific conditions in the field. For industry stakeholders, eco-printing development must be adapted to workforce capacity, raw material availability, production time, and market characteristics; for educators and supporting institutions, learning can integrate batik-making knowledge with ecological knowledge without eroding batik's cultural identity; whereas for policymakers, support must include access to materials and technology, market strengthening, waste management,

and incentives that enable effective implementation of sustainable practices. This study is limited to nine informants in the Pekalongan batik industry and does not comparatively assess the ecological impacts of eco-print and conventional batik. Therefore, future research could empirically test production models that integrate ecological, cultural, economic, and spiritual dimensions, including assessing the feasibility of a spirituality-based eco-batik concept through environmental impact assessments, economic analyses, comparative studies, and reviews of policy and educational implementation.

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F. Author Contributions Statement

AAI conceptualized and designed the study and served as the corresponding author. AAI was primarily responsible for conducting the field research, collecting and analyzing the data, and interpreting the findings. LR, as the lead co-author, contributed substantially to the identification and formulation of the key findings and to the conceptual and analytical development of the manuscript. MMI contributed to the theoretical review and refinement of the discussion, particularly by providing critical insights on the environmental ethics perspective of Seyyed Hossein Nasr. All authors reviewed and critically revised the manuscript and approved the final version.

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