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Transforming Waste into Blessings: Implementation of Eco-Efficiency Through Kawalu Embroidery Waste Upcycling from Halalan Toyyiban Perspective

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Abstract

The embroidery industry in Kawalu, Tasikmalaya, serves as a primary driver of the local economy; however, its production activities present serious environmental challenges due to the accumulation of fabric scraps that are not optimally managed, thereby triggering ecological waste accumulation. This linear production model contradicts the principle of halalan toyyiban, which strictly prohibits any actions causing environmental degradation (mudarat). This research aims to analyze the implementation of eco-efficiency through fabric waste upcycling strategies in the Kawalu embroidery center and evaluate its effectiveness from a halalan toyyiban perspective. A descriptive qualitative method with a case study approach was employed. Primary data were gathered through field observations and in-depth interviews with local embroidery entrepreneurs in Kawalu, which were subsequently analyzed using data reduction, data display, and conclusion-drawing techniques. The results indicate that implementing eco-efficiency via upcycling fabric scraps into valuable new creative products (such as industrial cleaning rags, accessories, and secondary fashion items) successfully reduces the volume of manufacturing waste and minimizes waste management operational costs. Furthermore, the findings confirm that this upcycling practice fulfills the indicators of the toyyib concept, wherein the production supply chain is not only compliant

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with sharia law (halal) but also generates communal welfare, minimizes adverse environmental impacts, and transforms waste into a blessed circular economic value.

Keywords: *circular economy, eco-efficiency, embroidery industry, halalan toyyiban, waste upcycling.*

INTRODUCTION

Modern economic development is frequently caught in a dilemma between accelerating industrial growth and maintaining ecological sustainability. Theoretically, the Sustainable Development Goals (SDGs) specifically Goal 12 concerning responsible consumption and production mandate that economic activities must not compromise long-term ecosystem capacity (Adetola Adewale Akinsulire et al., 2024; Richardson et al., 2022). Howevmall and medium scale manufacturing and handicraft sectors often ignore negative environmental externalities in pursuit of short-term profitability (Kraus et al., 2020; Tang & Zhu, 2020; Thomas, 2020). This dialectic creates a gap between *das Sollen* (ideal environmental preservation) and *das Sein* (exploitative field practices), which accelerates local environmental degradation if left unaddressed (Das, 2024).

In Indonesia, one of the creative industry sectors driving local economies while facing direct ecological challenges is the embroidery industry center in Kawalu District, Tasikmalaya City (Mulyani & Wibisono, 2020; Nurazizah & Prasodjo, 2022). According to official data from the Department of Cooperatives, SMEs, Industry, and Trade of Tasikmalaya City, Kawalu houses over 1,850 Small and Medium Industry (SMI) units, absorbing thousands of workers and serving as a major contributor to regional gross domestic product (Tasikmalaya, 2024). Nevertheless, high production output directly correlates with substantial volumes of non-biodegradable solid waste produced daily, primarily textile scraps accumulating around production zones (Indonesia, 2016).

Field evidence reveals that fabric scrap management in the Kawalu embroidery center remains far from ideal environmental sustainability standards. The Environmental Performance Information Document of Tasikmalaya City confirms that specific waste from local textile and embroidery sectors constitutes a primary burden on the Ciangir Landfill, as most business owners rely on conventional methods such as open burning or dumping scraps into rivers (indonesia, 2016; Rusliana et al., 2022). Burning synthetic fabric scraps releases toxic emissions such as dioxins into the atmosphere, escalating environmental health risks for nearby communities (Odubo & Kosoe, 2024; Sarwar & Khan, 2022).

To bridge the conflict between Kawalu's industrial productivity and environmental degradation, eco-efficiency serves as a viable theoretical solution. Eco-efficiency integrates economic and ecological performance, prompting industries to produce high-value goods competitively while minimizing environmental impacts across product life cycles (de Moura & da Silva, 2024; Khorasanizadeh et al., 2018; Ramirez-Corredores et al., 2023). An operational manifestation of this concept in textiles is upcycling, which transforms fabric scraps directly into higher-value functional and aesthetic products without chemical breakdown, unlike conventional downcycling (Kamble & Behera, 2021). Although upcycling potential in Kawalu is vast, its implementation remains sporadic due to a lack of structured collective adoption.

From a theological business ethics perspective, applying eco-efficiency through upcycling aligns with the Islamic principle of *halalan toyyiban*. Halal compliance in creative industries is often reduced to formal legal requirements, such as freedom from forbidden substances or valid

contractual agreements (Calder, 2020; Khalimy et al., 2023; Tsaqyfa & Sha'ari, 2024; Yakin et al., 2021). However, the *toyyiban* (wholesomeness/goodness) dimension requires a broader scope, encompassing process purity, sustainability guarantees, and the absence of harm (*la darar wa la dirar*) to humanity and nature. According to Qur'an 7:56, which strictly forbids environmental destruction, an embroidery enterprise cannot fully claim *toyyib* status if its supply chain causes ecological damage via unmanaged waste (Er, 2021; Helfaya et al., 2018; Hussain, 2020).

The dialectic between accumulating textile waste in Kawalu, ethical *halalan toyyiban* demands, and eco-efficiency solutions reveals a fundamental research gap. Existing literature on Kawalu embroidery focuses primarily on marketing strategies, cluster competitiveness, or digital technology adoption (Diawati & Loupias, 2019; Mulyani & Wibisono, 2020) . Conversely, studies integrating circular waste management with *Maqasid al-Shariah* specifically environmental protection (*hifdh al-biah*) within traditional embroidery SMIs remain rare. Consequently, artisans lack holistic guidance to transform production residue from an environmental cost center into a new economic profit center (Eglash et al., 2020; Scheel, 2016; Sehnem et al., 2021). Based on these theoretical, empirical, and theological imperatives, this study analyzes the real-world implementation of eco-efficiency through fabric scrap upcycling in Kawalu. Beyond documenting technical and financial hurdles, this study formulates a waste management model aligned with *halalan toyyiban* values. Through an interdisciplinary framework, the Kawalu embroidery industry can shift toward a green economy model that yields material profit while preserving ecological integrity and spiritual blessings for the broader community.

LITERATURE REVIEW

The theoretical foundation of this study integrates three main domains: industrial ecology, eco-efficiency-based operations management, and Islamic business ethics (*halalan toyyiban*). Discussions on modern manufacturing sustainability assert that industrial entities cannot act in isolation by extracting resources without addressing waste externalities (Busch et al., 2024; Scheel, 2016). Through an interdisciplinary approach, this review maps how solid textile waste can be converted into circular economic opportunities that are materially efficient, ethically pure, and socially beneficial (*toyyib*) (Islam et al., 2024).

The concept of eco-efficiency was established by the World Business Council for Sustainable Development (WBCSD) as a primary strategy to decouple economic growth from environmental degradation (Amadi et al., 2014; Caiado et al., 2017). Substantively, eco-efficiency guides businesses to optimize raw material, energy, and water consumption while minimizing waste intensity and pollution across production cycles (Caprian et al., 2023; Sheldon, 2018; Suppipat et al., 2023). This approach requires shifting paradigms from viewing waste as a cost center to recognizing it as a potential resource with residual value (Perey et al., 2018; Reddy et al., 2023).

In textile and apparel manufacturing, eco-efficiency faces complex challenges due to high synthetic material consumption and rapid pre-consumer solid waste generation (Abrishami et al., 2024; Niinimäki et al., 2020; Radhakrishnan, 2021). Previous research demonstrates that inefficient cutting layouts often result in 15% to 20% of raw materials turning into fabric scraps that end up in landfills (Aus et al., 2021; Ramkalaon & Sayem, 2021). Therefore, adopting clean production practices through optimized layout patterns and circular waste management is a key

metric for evaluating ecological efficiency in fashion and apparel industries (Hasan & Shehun, 2022; Karim & Hasan, 2022).

As an operational form of eco-efficiency, upcycling offers an advanced alternative beyond conventional recycling. Upcycling is defined as transforming waste materials into new products of higher quality, aesthetic value, and economic worth without chemical degradation (Bridgens et al., 2018; Koca & Koç, 2020). Through creative design, fabric scraps are elevated into high-value secondary fashion products targeting new market segments, rather than being downcycled into low-grade industrial fillers (Cook et al., 2022; Schirmeister & Mülhaupt, 2022).

Upcycling in creative industries yields dual benefits by conserving environments and providing financial incentives. Experimental studies in sustainable fashion confirm that reusing fabric scraps reduces industrial carbon footprints by decreasing reliance on virgin fiber production (Abrishami et al., 2024; Alves et al., 2024; Karim & Hasan, 2022). Economically, upcycled products yield favorable profit margins because raw material costs approach zero, strengthening the financial resilience of small enterprise operations (Ma et al., 2021; Maldonado-Romo et al., 2024).

The embroidery SMI ecosystem in Kawalu, Tasikmalaya, presents a representative case of a traditional industrial cluster reliant on knitted and woven fabric raw materials. Cluster studies identify that Kawalu's core strength lies in intergenerational craftsmanship and extensive distribution networks, whereas its primary vulnerability stems from a lack of self-sustained waste management technologies. Consequently, dense and colorful embroidery waste accumulates in residential zones, underscoring the necessity of structured upcycling interventions.

From a theological-ethical perspective, the core analytical axis rests on re-conceptualizing *halalan toyyiban* within Islamic economics. Islamic business ethics asserts that commodity quality depends not only on material compliance (*halal bi dzatihi*), but also on the ethical propriety of acquisition and production processes (*toyyib bi kasbihi*) (Dharma et al., 2023; Sunarti et al., 2023). A product fails full *toyyib* criteria if its value creation compromises social welfare or causes environmental damage. In Islamic eco-theology (*fiqh al-biah*), *toyyib* directly intersects with stewardship (*khalifah*) and moral responsibility (*amanah*) (Afandi, 2024; Gustanto & Mubarok, 2023; Warto & Arif, 2020). Islam views the universe as existing in a balanced state (*mizan*), making destructive resource exploitation an ecological injustice (Koehrsen, 2021; Razak, 2020). Managing production waste to avoid pollution is thus a religious obligation (*wajib shar'iyyah*) for Muslim entrepreneurs to preserve ecological balance.

The synthesis of Western eco-efficiency and Islamic *halalan toyyiban* principles yields a holistic framework: sharia-compliant green industry. Both frameworks reject wastefulness (*tabzir*) and environmental harm (*mudarat*). Integrating these perspectives positions material efficiency metrics as technical tools to fulfill *Maqasid al-Shariah*, particularly safeguarding life (*hifdh al-nafs*) and protecting the environment (*hifdh al-biah*).

In summary, current literature reveals a research gap regarding the operationalization of *halalan toyyiban* into technical upcycling indicators within local embroidery SMIs. A qualitative case study method is selected to investigate how Kawalu artisans respond to accumulating fabric waste. Guided by this framework, this study constructs a circular waste management model that is scientifically valid and morally grounded for Muslim creative enterprises.

METHOD

This study utilized a descriptive qualitative approach with an intrinsic case study design to examine field-level waste management practices. A qualitative design was chosen because the research problem extends beyond numerical waste metrics to encompass human behavior, ecological awareness, and underlying theological interpretations. Through a case study framework, the researchers explored how the embroidery SMI ecosystem in Kawalu District, Tasikmalaya City interacts with fabric scrap waste and how upcycling is applied as a tactical intervention.

The research site was deliberately selected in the embroidery center of Kawalu District, Tasikmalaya City, as it represents the largest embroidery cluster in West Java facing high ecological burdens from synthetic fabric scrap accumulation. Primary data sources were selected using purposive sampling to recruit informants with direct knowledge of the research topic (Sulistiyo, 2023). Key informants included Kawalu embroidery business owners, upcycling artisans, representatives from the Environmental Agency (*DLH*) of Tasikmalaya City, and local Islamic scholars (*ulama*) who evaluated *toyyib* standardizations.

Data collection was conducted simultaneously using in-depth interviews, passive participant observation, and documentation analysis (Atmowardoyo, 2018; Muzari et al., 2022). Semi-structured interviews explored internal motivations, financial constraints, and spiritual perspectives on environmental blessings among artisans. Structured observations documented waste accumulation points in production areas, sorting workflows, and disposal methods. Secondary documents, including official SMI statistics and upcycled product photographs, were gathered to support empirical triangulation.

Data analysis followed the interactive model by Miles, Huberman, and Saldana (Miles et al., 1996), comprising three cyclical steps: data condensation, data display, and conclusion drawing/verification. During condensation, interview transcripts and field notes were filtered to eliminate non-essential details. The condensed data were displayed via narrative accounts and comparative matrices to evaluate empirical upcycling practices against Western eco-efficiency indicators and Islamic environmental jurisprudence (*fiqh al-biah*). To establish data trustworthiness and credibility, source and technique triangulation were applied. Source triangulation involved cross-checking statements across business owners, municipal reports, and normative views from local Islamic scholars. Technique triangulation verified verbal interview disclosures against physical observations of plant disposal sites, ensuring objective, reliable, and valid analytical outcomes (Miles et al., 1996).

RESULT AND DISCUSSION

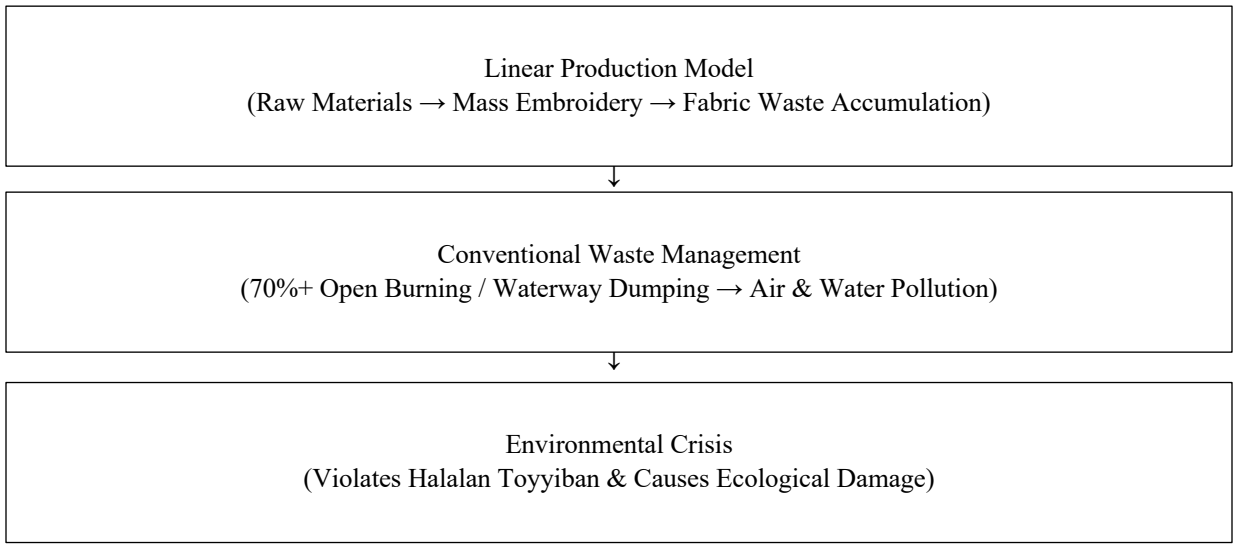
RESULTS

Empirical Reality and Fabric Scrap Waste Crisis in Kawalu

Field observations and in-depth interviews in the Kawalu embroidery center revealed that mass production generates substantial solid residues daily. Each embroidery SMI unit generates an average of 5 to 15 kilograms of fabric scraps per day, depending on operational computer embroidery machinery counts (Department of Cooperatives, SMEs, Industry, and Trade of Tasikmalaya City, 2024). Accumulating waste consists primarily of small synthetic fabric cuttings including satin, chiffon, and cotton alongside colorful polyester thread ends. These empirical findings indicate that linear economic growth in Kawalu creates negative environmental externalities through waste accumulation in surrounding residential areas.

Over 70% of micro and small artisans dispose of waste by burning scraps in open yards, dumping them on vacant lots, or discarding them into waterways (Environmental Agency of Tasikmalaya City, 2024; Indonesian Ministry of Environment and Forestry, 2022). Open burning of petroleum-based synthetic fabrics releases hazardous emissions such as dioxins and furans into the air, causing odor pollution and respiratory issues for local residents. These practices reflect an operational imbalance where business owners focus on maximizing short-term profits without managing pre-consumer solid waste responsibly.

Field observations in the Kawalu embroidery cluster indicate that waste management still follows a linear model. As presented in Figure 1, fabric scraps from the embroidery production process accumulate and are managed conventionally through open burning and dumping into Halalan Toyyibanpractice, where more than 70% of waste is burned, causes air and water pollution and triggers an environmental crisis that contradicts the principle of HalaHalalan Toyyiban.



Source : Data Processed by The Authors

Figure 1
Linear Production Model and Conventional Waste Management Practices Leading to Environmental Crisis in the Kawalu Embroidery Industry

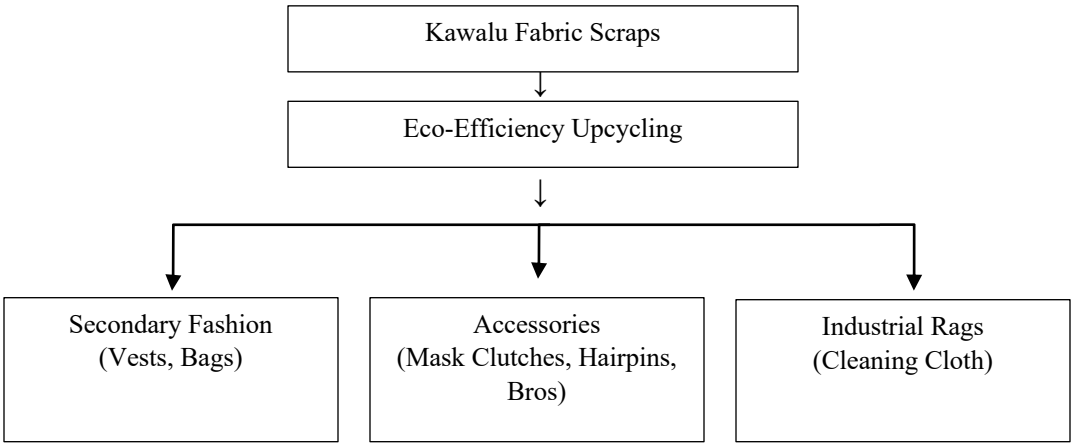
Upcycling Typologies and Operational Waste Management

Despite the prevalence of linear practices, field data identify three functional product categories resulting from community-based upcycling initiatives in Kawalu :

1. Secondary Fashion Items: Longer fabric strips are joined using patchwork techniques to produce vests, shopping bags, and ethnic tote bags.
2. Fashion Accessories: Smaller fabric remnants are crafted into mask connectors, hairpins, decorative brooches, and footwear appliqués.
3. Industrial Cleaning Rags: Non-stitchable remnants are bundled as industrial rags and sold to automotive workshops and factories outside Tasikmalaya.

In contrast to the linear model in Figure 1, field data also reveal an alternative circular approach. As illustrated in Figure 2, Kawalu fabric scraps are processed througupcyclingiciency

upcycling into three functional product categories: (1) secondary fashion, (2) fashion accessories, and (3) industrial rags. This model demonstrates the implementation of circular economy and upcycling principles at the community level.



Source : Data Processed by The Authors

Figure 2
Eco-Efficient Upcycling Model: Functional Product Typologies Derived from Kawalu Fabric Scraps

Waste transfers remain informal and sporadic, with larger embroidery shops supplying raw scraps free of charge to smaller artisan collectives or home-based workers. Without supportive municipal policy frameworks, eco-efficiency adoption across the broader Kawalu cluster remains partial (Environmental Agency of Tasikmalaya City, 2024).

DISCUSSION

Eco-Efficiency Integration in Traditional Creative Clusters

The traditional industrial practices in Kawalu illustrate the limitations of a linear "take-make-waste" economic model. Previous studies have noted that conventional linear production systems contribute to ecological degradation by treating natural resources and environmental waste-absorption capacity as virtually unlimited (Caiado et al., 2017; Caprian et al., 2023; Niinimäki et al., 2020). Discarding or burning non-biodegradable synthetic scraps transfers long-term environmental costs to the public and creates potential risks to environmental and human health (Cook et al., 2022; Jakhar et al., 2023). The environmental challenges associated with textile waste in Kawalu therefore highlight the need for cleaner production paradigms and more efficient resource utilization (Abrishami et al., 2024; Alves et al., 2024).

Evaluated against eco-efficiency criteria, upcycling practices in Kawalu address three core indicators: material intensity reduction, product life-cycle extension, and value creation. Utilizing fabric scraps reduces the demand for virgin materials and supports more circular approaches to textile production (Aus et al., 2021; Kamble & Behera, 2021; Ramkalaon & Sayem, 2021). Furthermore, transforming textile waste into secondary products extends material utilization and creates additional economic value from materials that would otherwise be discarded. Financially,

upcycling can alter cost structures for small and medium industries (SMIs) by reducing waste-management burdens while generating additional revenue through the commercialization of upcycled products.

However, expanding eco-efficiency initiatives across Kawalu faces structural and cultural barriers. Previous research on Tasikmalaya's embroidery industry has highlighted the importance of understanding the characteristics, resilience, and business development challenges of local embroidery entrepreneurs (Diawati & Loupias, 2019; Mulyani & Wibisono, 2020; Nurazizah & Prasodjo, 2022; Sunarti et al., 2023). In this context, constraints such as time limitations, insufficient design capabilities, and restricted access to specialized green market channels may limit the direct involvement of primary embroidery producers in upcycling activities. Nevertheless, diverting fabric remnants into creative secondary products can reintroduce discarded materials into productive economic supply chains, demonstrating the potential of circular business principles within small-scale traditional industries.

Theological Re-evaluation Through the Halalan Toyyiban Lens

Evaluating waste management practices in Kawalu through an Islamic legal and ethical lens requires distinguishing formal halal compliance from substantive toyyib principles. The concept of halalan toyyiban extends beyond the permissibility of products and transactions to encompass ethical considerations concerning production, consumption, and their broader consequences (Afandi, 2024; Warto & Arif, 2020). In terms of formal compliance (halal bi dzatihi), embroidery manufacturing in Kawalu may fulfill basic Islamic criteria when the materials used are permissible and the contractual relationships between business owners and workers comply with Islamic commercial principles (fiqh al-muamalat) (Gustanto & Mubarok, 2023; Warto & Arif, 2020).

Evaluating waste management in Kawalu requires distinguishing between formal halal and substantive toyyib dimensions. As illustrated in Figure 3, while embroidery production in Kawalu fulfills formal halal compliance (*halal bi dzatihi*) in terms of permissible raw materials and valid contracts (*fiqh al-muamalat*), it still exhibits a substantive toyyiban deficit due to improper waste burning and river dumping. This distinction is consistent with the broader understanding that Islamic environmental ethics requires business activities to consider their ecological consequences, rather than focusing exclusively on the permissibility of products and transactions (Helfaya et al., 2018; Koehrsen, 2021). Therefore, achieving a more comprehensive Halalan Toyyiban status necessitates a transition toward a circular toyyiban supply chain that integrates eco-efficiency and upcycling principles to support the objectives of *Maqasid al-Shariah* and environmental health.

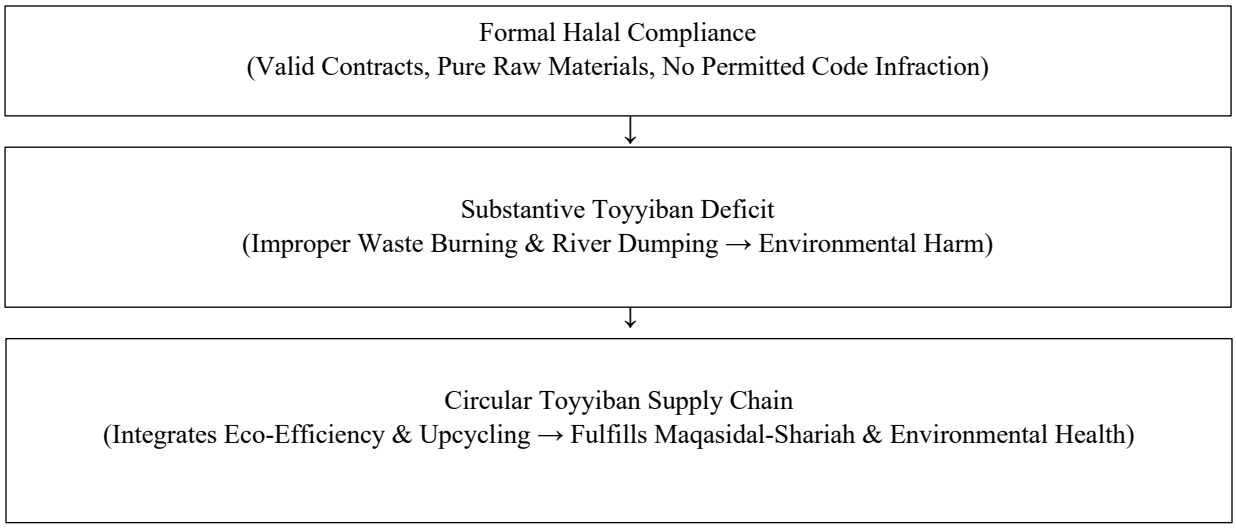


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Figure 3
Theological Re-evaluation Framework: Transition from Formal Halal Compliance to Circular Toyyiban Supply Chain in the Kawalu Embroidery Industry

However, formal compliance remains incomplete if evaluated against toyyiban principles. In Islamic environmental ethics, production and business activities should demonstrate responsibility toward ecosystems and avoid causing harm to other members of society (Helfaya et al., 2018; Koehrsen, 2021). Uncontrolled dumping or open burning of synthetic scraps can contaminate water channels and deteriorate air quality, conflicting with the Islamic principle of environmental stewardship and the prohibition of destructive practices (Cook et al., 2022; Hussain, 2020; Jakhar et al., 2023). Consequently, beautifully embroidered garments cannot be considered fully consistent with the substantive meaning of toyyib if their production processes generate environmental and health burdens for neighboring communities (Afandi, 2024; Helfaya et al., 2018).

Consequently, upcycling fabric scraps through eco-efficiency principles can be understood as a practical manifestation of collective environmental responsibility within Islamic eco-theology. Preserving ecological balance and avoiding resource wastefulness (*tabzir*) are consistent with Islamic ethical principles concerning responsible resource utilization and environmental protection (Afandi, 2024; Helfaya et al., 2018; Koehrsen, 2021). Sorting, stitching, and repurposing scraps into brooches or tote bags operationalize these principles by transforming materials that would otherwise become waste into economically beneficial products.

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Table 1
Eco-Efficiency & Halalan Toyyiban Operational Matrix

Dimensions	Eco-Efficiency Indicators	Halalan Toyyiban Objectives
Input	Material Intensity Reduction	Prevention of Resource Waste (Tabzir Injunction)

Dimensions	Eco-Efficiency Indicators	Halalan Toyyiban Objectives
Process	Waste Stream Minimization	Protection of Public Life & Ecosystems (Hifdh al-Nafs/Biah)
Output	Product Value Enhancement	Generation of Beneficial & Pure Livelihood (Toyyib Provision)
Economic Impact	Cost Elimination & Revenue Gain	Communal Welfare Enhancement (Maslahah Ammah)

Source : Data Processed by The Authors

Integrating eco-efficiency and *halalan toyyiban* yields an operational model: the *Circular Toyyiban Supply Chain*. Within this framework, ecological efficiency and upcycling value creation serve as means to fulfill public welfare (*maslahah ammah*). Reducing waste, cutting emissions, and creating home-based income opportunities for women in Kawalu reflect business practices that combine material return with social and environmental responsibility. This integration also reflects the potential of circular economy practices to connect environmental sustainability with the ethical objectives of Islamic business and production.

Socio-Economic Implications and Strategic Governance

The integration of upcycling practices and ethical awareness contributes to socio-economic resilience in Kawalu District. Previous studies of Tasikmalaya's embroidery industry have demonstrated the importance of local entrepreneurial resilience and the role of household-level economic activities in sustaining the livelihoods of embroidery workers and their families (Mulyani & Wibisono, 2020; Nurazizah & Prasodjo, 2022; Sunarti et al., 2023). In this context, upcycling networks, particularly those involving women and home-based artisans, have the potential to provide supplementary income for families of seasonal embroidery workers who are vulnerable to fluctuations in production orders. Converting fabric remnants into commercial fashion accessories also demonstrates how circular production practices can reduce material waste while creating additional economic opportunities (Bridgens et al., 2018; Kamble & Behera, 2021; Koca & Koç, 2020). To expand these circular practices, municipal authorities in Tasikmalaya could establish dedicated textile waste banks (Bank Sampah) in Kawalu to connect primary embroidery producers with upcycling artisans. Such initiatives could be supported by local data on the distribution of micro, small, and medium enterprises across Tasikmalaya's districts (Department of Cooperatives, SMEs, Industry, and Trade of Tasikmalaya City, 2024). Institutional collaboration between local government, embroidery producers, and community-based artisans would help establish more structured waste collection and material recovery systems. These measures could support Kawalu's development as a green creative enterprise cluster that combines economic competitiveness with environmental management.

CONCLUSION

This study concludes that implementing eco-efficiency through fabric scrap upcycling strategies in the Kawalu embroidery industry, Tasikmalaya, effectively transforms ecological waste into valuable creative commodities. Upcycling reduces synthetic textile waste volume in local residential environments while lowering waste handling costs for business owners. From a *halalan toyyiban* perspective, this marks a transition from linear production practices to a circular supply chain that supports public welfare (*toyyib*). These findings align with existing research showing that pre-consumer upcycling in local fashion industries elevates material value while

mitigating environmental impacts associated with open waste burning.

Theoretically, this research contributes a *Circular Toyyiban Supply Chain* model that links circular operations management with Islamic business ethics. Practically, it highlights opportunities to strengthen income stability for lower-income households in Kawalu. Strategically, municipal authorities in Tasikmalaya are advised to support institutional frameworks, such as dedicated textile waste banks, to connect primary embroidery SMIs with women-led upcycling initiatives. This policy direction aligns with industrial cluster literature emphasizing the role of regulatory support and multi-stakeholder partnerships in driving green transitions.

This study has limitations, including its qualitative single-case design focused exclusively on Kawalu District, which limits direct generalization to textile clusters with different socioeconomic characteristics. Additionally, quantitative assessments of carbon emission reductions or formal Life Cycle Assessments (LCA) were beyond the scope of this inquiry. Future research should employ mixed-method designs incorporating quantitative environmental audits to evaluate the ecological performance of upcycled products under *halalan toyyiban* frameworks.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article. Furthermore, the authors have no financial or personal relationships with other people or organizations that could inappropriately influence or bias the work reported in this paper.

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