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A Conceptual Framework Integrating Circular Economy and Islamic Values in Indonesia's Fashion Industry

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Abstract

Indonesia's fashion industry is largely shaped by a linear economic model that prioritises mass production and rapid consumption. This approach exacerbates textile waste and intensifies environmental pressures. While the transition to a circular economy has become increasingly urgent, several barriers hinder this shift, including high implementation costs, systemic complexity, technological limitations, and the gap between consumer awareness and actual purchasing behaviour. This study develops an integrative conceptual framework that combines Circular Economy (CE), Lean Production (LP), Industry 4.0 (I4.0), and Islamic values. The framework is underpinned by a descriptive qualitative approach, which is grounded in an extensive literature review and critical analysis. The findings suggest that the implementation of lean production without aligning it to circular principles may inadvertently reinforce linear fast fashion practices. In contrast, reimagining lean production as sustainable lean production, supported by I4.0 technologies, offers a means to reduce costs associated with reverse logistics and effectively manage the complexity inherent in circular systems. Islamic values provide an ethical foundation that strengthens commitments to sustainability, transparency, and responsible consumption behaviours. Overall, the proposed framework offers a coherent pathway to reconcile economic efficiency with environmental responsibility. The theoretical contribution of this study lies in expanding the literature on circular economy by integrating Islamic ethics within the context of the fashion industry. This approach offers new insights into the application of circular economy principles in a more holistic and value-based manner.

Keywords: Circular Economy; Lean Production; Industry 4.0; Islamic Values; Indonesian Fashion Industry.

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INTRODUCTION

Indonesia's fashion industry continues to operate predominantly within a linear economic paradigm, characterised by a take make dispose logic that prioritises resource extraction, mass production, and rapid disposal (Abbate et al., 2023; Abdelmeguid et al., 2022). This model generates substantial environmental harm, driven by excessive consumption and the large scale production of low cost garments with short lifespans. As a result, Indonesia produces approximately 2.3 million tonnes of clothing waste annually, of which only around 0.3 million tonnes are recovered or reused (Indonesia Ministry of Environment and Forestry, 2024). Population growth and rising purchasing power further intensify these pressures, leading to escalating volumes of textile waste and increasing carbon emissions across the fashion sector. Addressing these challenges requires a structural transition towards a circular economy, which emphasises strategies such as reduction, reuse, recycling, refurbishment, and remanufacturing in order to extend product life cycles and mitigate environmental impacts.

Nevertheless, the transition towards a circular economy within Indonesia's fashion sector remains constrained by a wide range of structural and operational challenges. These include financial limitations, technological inadequacies, organisational and managerial weaknesses, supply chain barriers, the absence of robust standards and regulatory frameworks, consumer related constraints, limited stakeholder pressure, and persistent difficulties in waste management, alongside negative consumer perceptions of recycled products (Khan, Paul, & Mubarik, 2022; Huang et al., 2021). Given that the circular economy is inherently technology driven, its effective implementation depends critically on the integration and deployment of appropriate technological solutions (Agyemang et al., 2019).

Consumers often perceive circular economy based products as relatively expensive and of inferior quality, largely because manufacturers produce them from reused or recycled materials. Nevertheless, sustainability has become an increasingly influential factor in contemporary apparel purchasing decisions, particularly among younger consumers (Kanchanapibul et al., 2014; Zhang et al., 2018). A substantial share of the global consumer population now consists of Generation Z, a cohort widely recognised for its technological literacy and strong social awareness (Rosidah, 2024). Rather than prioritising price or novelty alone, Generation Z demonstrates a clear preference for brands that align with their personal values and beliefs, especially with respect to environmental sustainability (Abrar et al., 2021). Consequently, evolving consumer behaviour most notably among Generation Z signals a significant opportunity for transforming the fashion industry. This generation's heightened sensitivity to environmental and sustainability issues positions it as a key catalyst for the adoption of more responsible and circular fashion practices.

Lean Production (LP) originated as a strategic philosophy derived from the Toyota Production System and subsequently evolved through three distinct phases. Initially, scholars and practitioners viewed it as a collection of operational tools, such as Kanban; it then developed into a manufacturing approach centred on methods such as Just in Time (JIT); and, ultimately, it emerged as a comprehensive management philosophy focused on minimising waste and reducing lead times. As a strategic framework, LP rests on five core principles value, value stream, flow, pull, and perfection which collectively aim to eliminate non value adding activities, enhance process reliability, respond effectively to customer requirements, and foster continuous improvement, thereby strengthening overall organisational performance (Koskela, 1995; Womack & Jones, 1996; Ioppolo et al., 2014).

Over recent decades, fast fashion has dominated the global apparel market; however, this trend has begun to show signs of decline. This shift is largely driven by growing consumer

awareness of the importance of ethical, environmentally responsible, and sustainability oriented modes of dress (Kaplan, 2024). Empirical evidence reported by Priscillia et al. (2024) indicates that more than 54 per cent of adolescents in Bandung are aware of the negative impacts associated with fast fashion. Despite rising public awareness of environmental issues, consumption of fast fashion products remains high. Globally, the fast fashion market was valued at over USD 106 billion in 2022 and is projected to reach approximately USD 185 billion by 2027. This expansion is also evident in Indonesia, where the fast fashion industry continues to grow rapidly alongside changing lifestyles and increasing demand for affordable, trend-responsive apparel (Purwanto, 2024). These patterns suggest that heightened knowledge and social awareness have not yet translated into meaningful shifts towards more sustainable consumption behaviour.

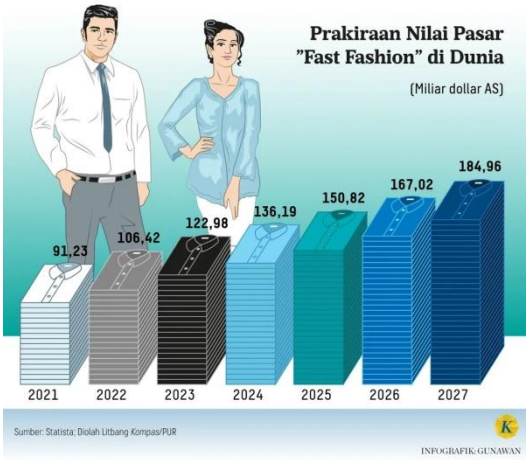

Figure 1. Fast Fashion Market Value Forecast Worldwide

This gap is further exacerbated when confronted with modern production innovation frameworks that integrate Circular Economy (CE), Lean Production (LP), and Industry 4.0, with CE serving as the foundation, LP as the pillar of operational efficiency, and Industry 4.0 as the technological pillar for achieving robust, profitable, and environmentally friendly businesses (Ciliberto & Depczynska, 2021). However, while numerous studies have explored the integration of these three concepts, most have overlooked the ethical dimension, particularly in relation to Islamic values in the fashion industry. This oversight has created a significant research gap, wherein the Islamic ethical perspective, which could reinforce commitments to sustainability and social responsibility, has yet to be incorporated into the model. In fact, Indonesia's fashion industry reveals a notable gap in this trifecta of innovation. This gap gives rise to operational profitability dilemmas for companies. The primary issue facing the industry is the transition from a linear (fast fashion) model to a circular model. This transition is often hindered by more complex and costly systems, such as the collection, sorting, and refurbishment of used products, compared to the production of new ones (Ciliberto & Depczynska, 2021). This problem stems from the gap between sustainability demands and the reality of operational costs, prompting the critical question: "How can companies integrate high costs while maintaining efficiency and profitability equal to or greater than that of the fast fashion model?"

THEORITICAL REVIEW

Entrepreneurial Innovation Theory

Entrepreneurial innovation theory, as articulated by Joseph Schumpeter, conceptualises entrepreneurship fundamentally as a process of innovation. Entrepreneurs act as agents of change who stimulate economic growth through the creation of new products, processes, and business models capable of disrupting existing markets. By creatively recombining resources, entrepreneurs generate added value, thereby underscoring the centrality of creativity, technological advancement, and the capacity to anticipate market trends as key determinants of economic success (Martin, 2012). Empirical evidence, however, suggests that the majority of firms within the fashion industry continue to adopt business strategies primarily oriented towards responding to consumer demand for fashionable and low-priced apparel. This orientation encourages rapid production cycles, cost minimisation, and an emphasis on sales volume, often at the expense of sustainable innovation and product circularity (Pasha & Firmansyah, 2025).

Fast fashion brands such as Zara and H&M operate on extremely rapid trend cycles, introducing new product styles on a weekly basis and generating as many as 52 trend changes each year (Rise, 2025). This pattern suggests that much of the innovation evident in the contemporary fashion industry is largely trend-driven rather than genuinely transformational, prioritising novelty and market responsiveness over sustainability oriented innovation grounded in Islamic values, such as ethical consumption, moderation, and environmental responsibility. As a result, a clear discrepancy emerges between innovation theory and industry practice. While innovation theory emphasises the creation of new value through creativity and long term sustainability, entrepreneurial innovation within the fashion sector continues to concentrate on short-term commercial considerations. Consequently, the industry has yet to fully embrace forms of innovation aligned with circular economy principles and Islamic value based frameworks that support enduring social and environmental sustainability.

The theory of entrepreneurial innovation provides the foundation for creating new value through creativity, which must be directed towards sustainable innovation within the fashion sector. In parallel, the principles of the circular economy offer a framework for efficiently managing resources and reducing waste through sustainable approaches, thereby complementing the entrepreneurial innovation goal of generating long-term value. Islamic values, in turn, offer an ethical foundation that reinforces the principles of sustainability, simplicity, and social responsibility in entrepreneurial practice. Consequently, this framework not only integrates these theories but also clearly maps the contribution of each to fostering sustainable, value-driven innovation within the fashion industry.

Theory of Reasoned Action

The Theory of Reasoned Action (TRA), developed by psychologists Martin Fishbein and Icek Ajzen in the 1970s, conceptualises behaviour as the outcome of a systematic relationship between beliefs, attitudes, intentions, and actual actions. Within this framework, behavioural intention represents the most immediate and reliable predictor of behaviour; understanding an individual's intention therefore provides the strongest indication of how that individual is likely to act. In the context of fast fashion, consumers are increasingly aware of its negative environmental and social impacts (Priscillia et al., 2024), which has contributed to the formation of more favourable attitudes towards environmentally responsible fashion.

However, such intentions do not consistently translate into sustainable purchasing or usage behaviour. Perceived behavioural constraints frequently inhibit the enactment of pro

environmental intentions. In particular, consumers often regard circular economy based products as relatively expensive, which diminishes their willingness to purchase such alternatives (Nishijima et al., 2020). In addition, prevailing social norms may frame circular products as inferior in quality due to their association with reused or recycled materials (Suhardono et al., 2025). From a theoretical perspective, rising awareness and positive attitudes should stimulate stronger intentions and, ultimately, more sustainable consumption behaviour. Empirically, however, a persistent intention behaviour gap remains evident, as consumers continue to favour fast fashion products despite their awareness of the associated negative consequences.

The Theory of Reasoned Action can inform the framework by highlighting how positive attitudes towards sustainability can lead to stronger intentions to engage in environmentally friendly consumption. However, it also illustrates how external factors, such as the perceived cost of circular products and social norms, can obstruct the translation of these intentions into actual behaviours. This theoretical insight helps to identify the barriers to sustainable consumption, which the framework aims to address. By integrating this theory with the concepts of circular economy, lean production, and Islamic ethics, the framework can provide a more comprehensive approach to overcoming the disconnect between intention and behaviour in the fashion industry.

RESEARCH METHODS

This study adopts a descriptive qualitative approach through a literature based critical review method (Creswell et al., 2017). The primary objective is to develop a conceptual framework that integrates circular economy principles with Islamic values within Indonesia's fashion industry. In particular, the analysis focuses on key circular strategies reduce, reuse, recycle, refurbish, and remanufacture alongside implementation challenges, including financial, technological, and managerial constraints, and examines Islamic business ethics as a source of internal motivational drivers.

The object of analysis encompasses circular economy theory in the fashion sector and principles of Islamic economics, drawing on secondary data obtained from reputable academic journals indexed in Scopus and Web of Science, authoritative textbooks, and official reports, including government data indicating annual textile waste generation of approximately 2.3 million tonnes from the Ministry of Environment and Forestry. Data collection employed documentation techniques involving keyword identification (e.g. "Circular Economy in Fashion" and "Islamic Business Values"), systematic screening, and thematic categorisation covering fashion waste, barriers to circularity, and Islamic ethical principles (Fink, 2019).

Data analysis combined qualitative content analysis with theoretical synthesis, encompassing data reduction, critical evaluation, integrative synthesis, and the construction of an innovation model. To enhance analytical rigour, the study applies source triangulation by comparing theoretical perspectives from diverse scholarly traditions, including Western and Islamic frameworks. This approach ensures that the resulting integrative model is comprehensive, logically coherent, and academically robust from both Western and Islamic viewpoints (Gazzola et al., 2025).

RESULTS AND DISCUSSION

Implementation of the Circular Economy in Indonesia's Fashion Industry

The implementation of the circular economy within Indonesia's fashion industry is still in its early stages, with efforts primarily focused on transitioning from a linear "take-make-dispose" model to a closed-loop system that emphasises reuse, recycling, and extending

product lifecycles through collaboration among stakeholders such as the government, designers, and zero-waste communities. Initiatives such as the Circular Fashion Partnership Indonesia, alongside cases in Surabaya and Yogyakarta, demonstrate the use of systemic design approaches and actor-network theory to build networks involving human actors (designers, businesses, policymakers) and non-human actors (technologies, policies), all supported by the National Circular Economy Roadmap 2025-2045, which prioritises the textile and fashion sectors.

Despite these initiatives, significant barriers persist, including low consumer awareness, weak regulatory enforcement, high implementation costs, and insufficient infrastructure. However, collaborative efforts and local innovations, particularly in traditional industries such as batik, show promise for sustainable progress (Handayani & Piliang, 2024). These observations indicate that the adoption of circular economy practices within Indonesia's fashion industry remains largely fragmented, with a predominant focus on recycling. The full integration of closed-loop systems, encompassing sustainable product design, extended product lifecycles, and integrated reverse logistics, has yet to be realised. As a result, most circular economy practices remain confined to downstream activities, failing to bring about fundamental changes in business models or value chains within the fashion industry (Gazzola et al., 2025).

The Role of Lean Production in Supporting or Constraining the Circular Economy

Lean Production (LP) is a concept that has evolved substantially over time. Initially, scholars and practitioners understood LP as a set of technical tools such as Kanban designed to regulate production flows. It subsequently developed into a manufacturing approach centred on practices such as Just in Time (JIT), and ultimately matured into a comprehensive management philosophy focused on reducing waste and lead times across organisational processes (Koskela, 1992). Lean aims to create customer value through five core principles value, value stream, process flow, pull systems, and continuous improvement thereby enabling firms to operate more efficiently and reliably (Womack & Jones, 1996). The concept further emphasises achieving more with fewer resources by systematically eliminating various forms of waste, including defects, overproduction, excess inventory, and energy inefficiency (Sciortino & Watson, 2009). Rooted in the principles of the Toyota Production System, lean production functions as a managerial strategy to enhance organisational performance through operational efficiency, process reliability, and sustained continuous improvement (Ioppolo et al., 2014).

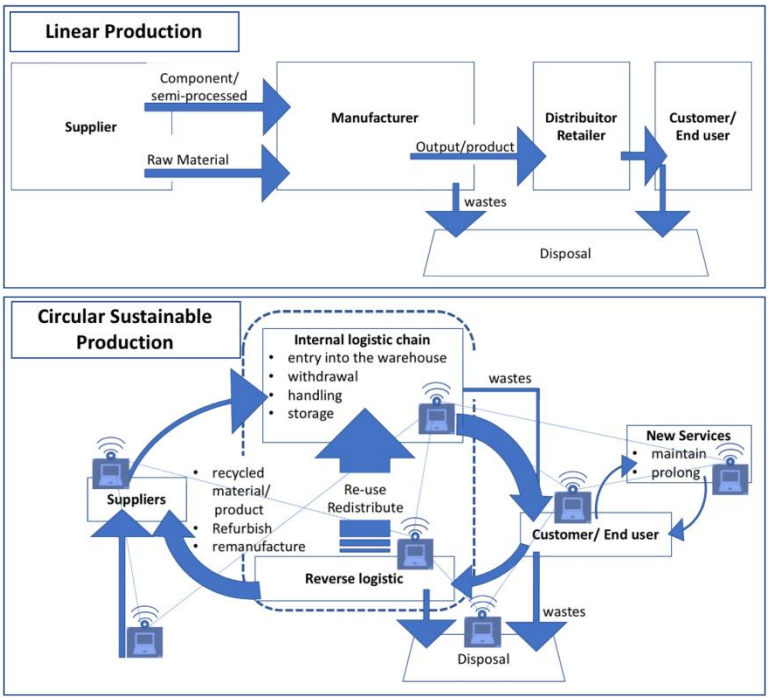

Figure 2. Source : (Ciliberto, et al., 2021)

The figure illustrates a comparison between the linear production model and the sustainable circular production model. In the linear production model, the production flow follows a one-way path, starting with suppliers providing raw materials and semi-finished components. These are then processed by manufacturers into final products, distributed through wholesalers or retailers, and ultimately consumed by customers or end-users. In this model, waste generated during both the production and consumption stages is directed straight to disposal, reflecting the end-of-life concept. This approach results in the loss of material value and exacerbates environmental pressures (Ciliberto et al., 2021).

By contrast, the sustainable circular production segment depicts a more complex yet efficient system in which production flows do not terminate at final consumption. Waste and post-use products are reintegrated into the system through reverse logistics and subsequently processed via reuse, redistribution, refurbishment, and remanufacturing activities. Recycled materials and refurbished products can then re-enter the production cycle as new inputs for suppliers or manufacturers. This model also underscores the importance of internal logistics chains encompassing storage, handling, and warehouse management as well as the development of value added services such as maintenance and product life extension. Consequently, product value no longer resides solely in ownership but in sustained functionality across the entire life cycle. Through this approach, the circular economy facilitates waste reduction, resource optimisation, and the simultaneous creation of economic, environmental, and social value, in alignment with the principles of sustainable lean production and supported by Industry 4.0 technologies (Ciliberto et al., 2021).

In the Indonesian context, however, Lean Production (LP) within the fashion industry tends to function primarily as a mechanism for cost reduction and the acceleration of mass production, rather than as a tool for advancing circularity. Firms predominantly employ lean practices to eliminate short-term process inefficiencies, with limited emphasis on optimising post-consumption material flows. Firdaus et al. (2025) reinforce this view by arguing that, when not integrated with green practices, lean production may even impede sustainability

efforts. Its strong focus on internal efficiency frequently overlooks full recycling loops, supply chain collaboration, and remanufacturing innovation, largely due to managerial constraints and high implementation costs in Indonesia. Consequently, in the absence of systematic integration with circular economy principles, lean production risks reinforcing linear fast fashion models rather than facilitating a transition towards more sustainable and circular production systems (Ciliberto et al., 2021).

Accordingly, lean production and the circular economy exhibit both synergistic potential and conceptual tensions. Lean production prioritises throughput optimisation and the elimination of operational waste, whereas the circular economy emphasises stock optimisation and the repeated utilisation of materials. In the absence of effective integration, lean practices may accelerate linear production flows, while circular economy principles require the slowing down of processes and the extension of product life cycles. For this reason, scholars have called for a reconceptualisation of lean as sustainable lean production, in which material waste is redefined as a valuable resource rather than a residual inefficiency (Ciliberto et al., 2021; Zhang et al., 2018).

Industry 4.0 as an Enabler of Circular Transformation

Industry 4.0 (I4.0) plays a strategic role in bridging lean efficiency with the inherent complexity of the circular economy. Technologies such as artificial intelligence, the Internet of Things, blockchain, and digital product passports have demonstrated considerable potential to enhance supply chain transparency, improve the efficiency of reverse logistics, and enable comprehensive material traceability throughout the entire product life cycle (Gazzola et al., 2025).

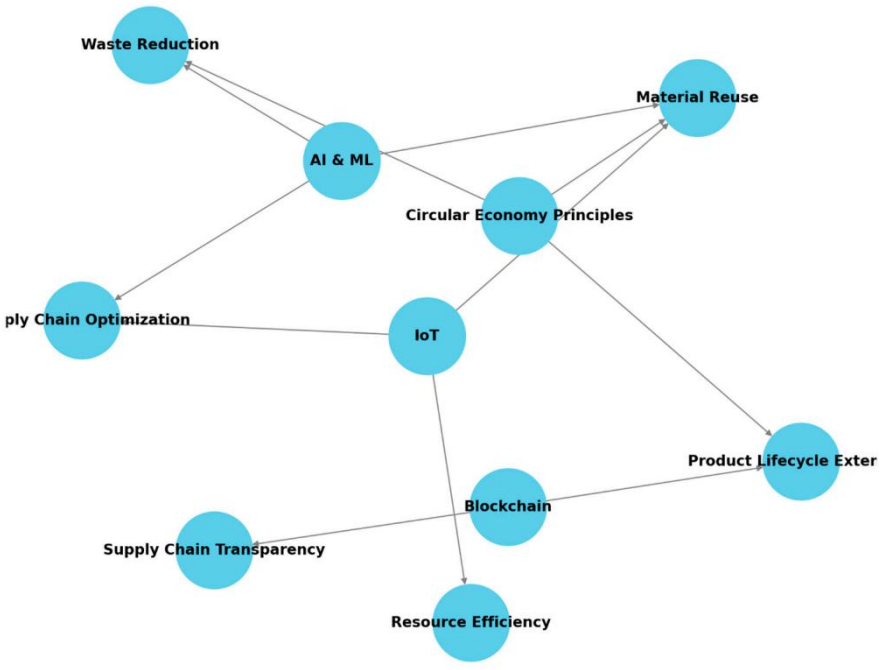

Figure 3. Source : (Gazzola, et al., 2025)

The figure illustrates the relationship between digital technologies and the implementation of circular economy principles. Artificial intelligence (AI) and machine learning (ML) play a pivotal role in advancing circular practices by enabling firms to reduce waste, optimise supply chains, and enhance material reuse. These technologies support demand

forecasting, minimise overproduction, and identify opportunities for material recovery and reuse, thereby rendering production processes more efficient and sustainable. In addition, the Internet of Things (IoT) and blockchain function as key enabling technologies in the operationalisation of circular economy principles. IoT facilitates real time monitoring of resource use, which enhances resource efficiency and extends product life cycles through timely maintenance and repair interventions.

Blockchain technology further enhances supply chain transparency by providing secure and traceable data on material origins, production processes, and product distribution. In this way, circular economy principles not only mitigate environmental impacts but also generate new forms of economic value through efficiency gains, service innovation, and more responsible resource utilisation. This strategic orientation is reflected in Indonesia's national roadmap, which identifies the textile and apparel sector as a priority for digital integration and circular practices.

Nevertheless, adoption remains largely confined to small and medium sized enterprises within the batik and local fashion industries, where digital technologies are primarily used for marketing rather than for optimising circular processes such as AI driven demand forecasting or real time IoT based monitoring. These limitations stem from infrastructural constraints, high investment costs, limited managerial capabilities, and underdeveloped regulatory frameworks, despite policy support under Vision 2045. Addressing this gap requires closer collaboration between government and industry, combining local knowledge with proven European Asian technologies that have demonstrated effectiveness in enhancing resource efficiency and fostering remanufacturing innovation (Rahmadi, 2020; Firdaus et al., 2025; Handayani et al., 2024).

Integrating Islamic Values into Circular Economy Practices

The integration of Islamic values into the practice of the circular economy within Indonesia's fashion industry can be understood as an effort to conduct business in a manner that upholds humanity's trust as stewards of the earth, promotes balance, and avoids excessiveness (israf) through waste reduction, material reuse, repair, and product recycling. The Maqasid al-Shariah framework is particularly relevant, as it emphasises the social and environmental welfare, aligning with the principles of the circular economy that seek to close material loops and minimise waste (Campra et al., 2021). The textile and apparel supply chain in Indonesia is gradually shifting towards more sustainable practices, yet it still faces challenges such as supply chain complexity and the readiness of industry players, particularly small and medium-sized enterprises (SMEs) (Sarasi et al., 2024). Islamic values can be translated into concrete policies and practices, such as the design of more durable products, take-back and resale programmes, the repurposing of deadstock, and material traceability. Technology plays a crucial role as a bridge to achieving sustainability, emphasising the use of AI, IoT, blockchain, and software to enhance resource efficiency, reduce waste, and improve supply chain traceability within circular business models (Gazzola et al., 2025).

Research on the application of blockchain technology in Indonesia's halal fashion traceability systems demonstrates that digital innovation can significantly enhance supply chain transparency and accountability. These improvements align closely with Islamic ethical imperatives of honesty, justice, and responsibility, thereby enabling circular practices to be more readily verified and communicated to consumers (Sumarliah et al., 2022). Accordingly, the synergy between Islamic values, technological innovation, and circular practices holds considerable potential to steer Indonesia's fashion industry towards business models that are both more sustainable and ethically grounded.

However, significant challenges exist in operationalising Islamic values across the diverse actors within the industry. While, in theory, Islamic values support circular economy practices, their implementation on a large scale confronts complex realities. Various stakeholders, including large corporations and small-to-medium enterprises (SMEs), may possess vastly different capacities to understand and implement policies based on Islamic principles. Additionally, disparities in knowledge, infrastructure, and access to technology may impede the adoption of circular practices that align with Islamic values. As such, a pragmatic approach is required to balance normative optimism with operational challenges, ensuring that the integration of Islamic values into the circular economy is both effective and feasible across the entire supply chain, without disregarding the practical conditions on the ground.

An Integrative Model

The transformation of the fashion industry towards a sustainable, ethical, and competitive model cannot be achieved through isolated or partial approaches, whether focused solely on technology, operational efficiency, or normative values. Instead, this transition requires an integrative model that simultaneously brings together and mutually reinforces four key pillars: the Circular Economy (CE), Lean Production (LP), Industry 4.0 (I4.0), and Islamic values, as illustrated in the proposed framework.

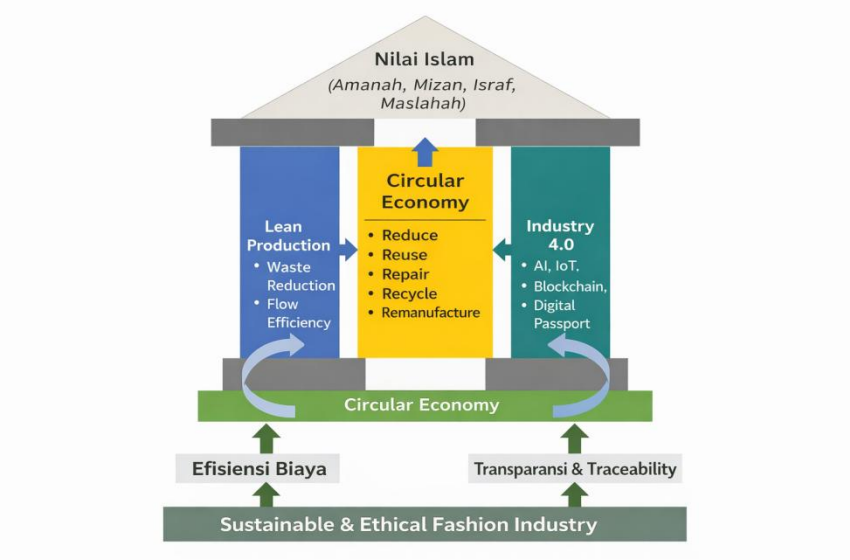

Figure 4. Sustainable & Ethical Fashion Industry

Within this model, the Circular Economy functions as the foundational framework of the production system, guiding the industry towards closing material loops through strategies such as reduction, reuse, repair, recycling, and remanufacturing. CE shifts the industry's orientation away from volume-driven linear logic towards the optimisation of material value and the extension of product life cycles. Lean Production subsequently operates as a mechanism for operational efficiency and cost stability, focusing on the elimination of process waste, the improvement of workflow, and the reliability of production systems. Within this integrative framework, however, lean is reconceptualised as sustainable lean production, in which waste elimination extends beyond internal processes to encompass material and post-consumption waste, reframed as valuable resources.

Within this model, Industry 4.0 functions as a technological enabler that mediates the potential tensions between lean production and the circular economy. Digital technologies such as artificial intelligence, the Internet of Things, blockchain, and digital product passports

facilitate supply chain transparency, material traceability, efficient reverse logistics, and data-driven decision-making across the entire product life cycle. With the support of Industry 4.0, firms can manage the inherent complexity of circular systems without compromising the efficiency that lies at the core of lean production.

As a normative and ethical layer, Islamic values function as a guiding framework for business behaviour and strategic orientation. Principles such as amanah, mizan, the prohibition of israf, and maslahah provide moral legitimacy for circular economy practices and reinforce long term commitments to social and environmental sustainability. Within Indonesia's fashion industry, these values further enhance consumer trust through greater transparency, supply chain justice, and accountability, particularly when supported by technologies such as blockchain that enable halal fashion traceability. Accordingly, an integrative model combining the Circular Economy, Industry 4.0, and Islamic values offers a compelling response to the longstanding tension between profitability and sustainability. The circular economy safeguards resource sustainability, lean production preserves cost efficiency and competitiveness, Industry 4.0 enables the practical management of complex systems, and Islamic values ensure that this transformation unfolds within an ethical and socially responsible framework. This model is especially pertinent to Indonesia's fashion industry, which faces increasing global pressures to enhance sustainability while maintaining efficiency, and it provides a strategic conceptual framework for policymakers, industry practitioners, and future researchers.

The conceptual framework developed in this study contributes to the literature by contextually integrating Lean Production (LP), the Circular Economy (CE), and Industry 4.0 (I4.0) within Indonesia's fashion industry a sector traditionally driven by cost efficiency and mass production imperatives. This integration extends existing literature by demonstrating how lean principles can be adapted to support circularity when combined with digital technologies that enable the management of systemic complexity. Moreover, the framework introduces Islamic values as an ethical and behavioural dimension, an area that has received limited attention in circular economy research, particularly in the fashion sector. Values such as amanah, mizan, the avoidance of israf, and maslahah reinforce sustainability commitments not only at the level of systems and technologies but also by shaping the moral orientation of industry actors and consumers. In this way, the framework bridges the long-standing divide between economic efficiency and environmental responsibility, illustrating how profitability, technological innovation, and sustainability can be pursued simultaneously within a single integrative model, particularly relevant to developing countries such as Indonesia.

CONCLUSION

This study concludes that the successful transformation of Indonesia's fashion industry towards a sustainable, ethical, and competitive model cannot be achieved through partial or fragmented approaches. The circular economy must be positioned as the foundational logic of the production system in order to close material loops and extend product life cycles. Lean Production, which has traditionally emphasised short term cost efficiency, requires reconceptualisation as sustainable lean production so that it supports circularity rather than accelerating linear fast fashion flows.

Industry 4.0 functions as a critical enabler by facilitating efficiency, transparency, and material traceability through digital technologies such as artificial intelligence, the Internet of Things, and blockchain, thereby allowing the practical management of circular economy complexity. In addition, Islamic values contribute an ethical and behavioural dimension that reinforces sustainability through principles of amanah (trust), balance, the prohibition of

wastefulness, and maslahah (public benefit), while simultaneously strengthening consumer trust.

Accordingly, the integrative model combining Lean Production (LP), the Circular Economy (CE), Industry 4.0 (I4.0), and Islamic values effectively addresses the tension between profitability and sustainability. It offers a strategic framework that is particularly relevant for the development of Indonesia's fashion industry amid growing global pressures for responsible and sustainable business practices.

REFERENCES

Abbate, S., Centobelli, P., & Cerchione, R. (2023). From Fast to Slow: An Exploratory Analysis of Circular Business Models in the Italian Apparel Industry. *International Journal of Production Economics*.

Abdelmeguid, A., Afy-Shararah, M., & Salonitis, K. (2022). Investigating the challenges of applying the principles of the circular economy in the fashion industry: A systematic review. *Sustainable Production and Consumption*, Pages 505-518.

Abrar, M., Sibtain, M. M., & Shabbir, R. (2021). Understanding purchase intention towards eco-friendly clothing for generation Y & Z. *Cogent Business & Management, Volume 8*.

Agyemang, M., Kusi-Sarpong , S., Khan, S., Mani, V., Rehman, S., & Kusi-Sarpong, H. (2019). Drivers and barriers to circular economy implementation: An explorative study in Pakistan's automobile industry. *Management Decision, 57 (4)*, 971–994.

Campra, M., Brescia, V., Sadeghi, V. J., & Calandra, D. (2021). Islamic countries and Maqasid al-Shariah towards the circular economy. The Dubai case study. *EJIF - European Journal of Islamic Finance*, 1-10.

Ciliberto, C., & Depczynska, K. S. (2021). Enabling the Circular Economy transition: a sustainable lean manufacturing recipe for Industry 4.0. *Business Strategy and The Environment*, 3255–3272.

Creswell, J., & Poth, C. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches (4th ed.).* SAGE Publications.

Fink, A. (2019). *Conducting research literature reviews: From the internet to paper (5th ed.).* Sage Publications.

Firdaus, F., Setyono, P., Gravitiani, E., & Liquiddanu, E. (2025). Key Drivers and Barriers to Circular Economy Practices in the Global Textile and Fashion Industries: Sustainable Strategies for the Indonesian Batik Industry. *International Journal of Sustainable Development and Planning, Vol.20 No.1*, 327-346.

Gazzola, P., Pavione, E., Hillebrand, R., Vota, V., & Rosa, R. (2025). The Circular Economy and the Role of Technology in the Fashion Industry: A Comparison of Empirical Evidence. *Sustainability, 17(7)*, 3104.

Handayani, R. B., & Piliang, Y. A. (2024). Systemic Design for Collaborative Circular Fashion Initiatives: A Case Study in Surabaya. *JDI (Jurnal Desain Indonesia), Vol 6 No 1*.

Huang, Y.-F., Lin, T.-J., Azevedo, S., & Cheng, C.-S. (2021). Exploring the Decisive Barriers to Achieve Circular Economy: Strategies for the Textile Innovation in Taiwan. *Sustainable Production and Consumption, 27(4)*.

Indonesia Ministry of Environment and Forestry. (2024). *National waste management*. Retrieved 10 29, 2025, from https://sipsn.menlhk.go.id/sipsn/public/data/timbulan: https://sipsn.menlhk.go.id/sipsn/public/data/timbulan

Ioppolo, G., Cucurachi, S., Salomone, R., Saija, G., & Ciraolo, L. (2014). Industrial Ecology and Environmental Lean Management: Lights and Shadows. *Sustainability, 6 (9)*, 6362-6376.

Kanchanapibul, M., Wang, X., Lacka, E., & Chan, H. (2014). An empirical investigation of green purchase behaviour among the young generation. *Journal of Cleaner Production, 66*, 528-536.

Kaplan, A. (2024). Fast Fashion's Fate: Artificial Intelligence, Sustainability, and the Apparel Industry. *Artificial Intelligence for Sustainability*, pages 13-30, Springer.

Khan, S. A., Paul, S. K., & Mubarik, M. S. (2022). Analyzing cause and effect relationships among drivers and barriers to circular economy implementation in the context of an emerging economy. *Journal of Cleaner Production, 364(2)*.

Koskela, L. (1992). *Application of the new production philosophy to construction.* Stanford University, CA: Technical Report No. 72, CIFE.

Koskela, L. (1995). *Application of the new production philosophy to construction .* CA: Stanford University.

Martin, B. (2012). The evolution of science policy and innovation studies. *Research Policy*, Pages 1219-1239.

Nishijima, D., Nansai, K., Kagawa, S., & Oguchi , M. (2020). Conflicting consequences of price-induced product lifetime extension in circular economy: The impact on metals, greenhouse gas, and sales of air conditioners. *Resources, Conservation and Recycling, 162*, 105023.

Pasha, S., & Firmansyah, A. (2025). MENGURANGI DAMPAK FAST FASHION MELALUI SINERGI UMKM, PEMERINTAH, DAN SWASTA. *Journal of Law, Administration, and Social Science, Volume 5 No.3*, 358-373.

Priscillia, M., Achdiani, Y., & Abdullah, M. A. (2024). Kesadaran Tren Fast Fashion pada Remaja di Kota Bandung. *Jurnal IDEAS | Pendidikan, Sosial, dan Budaya*, 511-518.

Purwanto, A. (2024, 10 04). *Tren, Apa Dampaknya terhadap Keberlanjutan?* Retrieved 11 10, 2025, from KOMPAS, "Fast fashion" mengubah paradigma mengenai industri pakaian dan memunculkan dampak bagi masyarakat serta lingkungan.: https://www.kompas.id/artikel/fast-fashion-kian-menjadi-tren-apa-dampaknya-terhadap-keberlanjutan

Rahmadi, A. (2020). Transition Trends and Readiness of Indonesia – Textile and Apparel Industry for Industry 4.0 and Circular Economy. *Assessing the Readiness for Industry 4.0 and the Circular*, 251-302.

Rise. (2025, 02 20). *Healt Heroes Indonesia*. Retrieved 11 12, 2025, from https://healtheroes.id/sisi-gelap-fast-fashion/:https://healtheroes.id/sisi-gelap-fast-fashion/

Rosidah, R. (2024). Exploring the perception, knowledge, and behavioral tendency to use eco-friendly products of Generation Z in Tangerang Selatan. *IOP Conference Series: Earth and Environmental Science*, 012087.

Sarasi, V., Primiana, I., Harsanto, B., & Satyakti, Y. (2024). Sustainable supply chain of Indonesia's textile & apparel industry: opportunities and challenges. *Research Journal of Textile and Apparel, 28 (4)*, 819–838.

Sciortino, M., & Watson, S. (2009). The Importance of Energy Efficiency in Lean Manufacturing : Declaring Energy the Ninth Waste. *Proceedings of the 2009 ACEEE Summer Study on Energy Efficiency in Industry*, 113-122.

Suhardono, S., Phan, T., Lee, C.-H., & Suryawan, I. (2025). Design strategies and willingness to pay for circular economy service policies in sustainable tourism. *Environmental Challenges, 18*, 101081.

Sumarliah, E., Li, T., Wang, B., Fauziyah, & Indriya. (2022). Blockchain-Empowered Halal Fashion Traceability System in Indonesia. *International Journal of Information Systems and Supply Chain Management (IJISSCM), 15(2)*, 24.

Womack, J., & Jones, D. (1996). *Lean thinking, banish waste and create wealth in your corporation (1st ed.).* Productivity Press.

Zhang, L., Chen, L., Wu, Z., Zhang, S., & Song, H. (2018). Investigating Young Consumers' Purchasing Intention of Green Housing in China. *Sustainability, 10(4)*, 1044.