Beyond Fast Fashion: A Comparative Review of Upcycling and Recycling Strategies in Sustainable Fashion Design

Ananna Mostafiz

Faculty Member, Department of Fashion Design & Technology Shanto-Mariam University of Creative Technology, Dhaka, Bangladesh

DOI: https://doi.org/10.51584/IJRIAS.2026.11030011

Received: 04 March 2026; Accepted: 09 March 2026; Published: 26 March 2026

ABSTRACT

The environmental impact of the global fashion industry has intensified concerns regarding unsustainable production practices and the rapid accumulation of textile waste. As the fast fashion model continues to dominate global clothing markets, researchers and industry stakeholders are increasingly exploring circular strategies capable of reducing environmental harm while maintaining economic viability. Among the most widely discussed approaches are recycling and upcycling, both of which aim to extend the lifecycle of textile materials and reduce dependence on virgin resources. However, existing academic literature often discusses these strategies separately, with relatively few studies offering a systematic comparison between them within the context of sustainable fashion design. This study presents a structured literature review that critically examines recycling and upcycling as complementary strategies within circular fashion systems. Academic articles, books, institutional reports, and conference publications published between 2010 and 2024 were identified through systematic searches of databases including Scopus, Google Scholar, and JSTOR. After applying inclusion criteria related to relevance, academic credibility, and thematic focus, 65 sources were selected and analyzed using thematic content analysis. The findings indicate that recycling is primarily associated with industrial-scale material recovery and technological processing that allows large volumes of textile waste to be converted into new fibers. While this approach can reduce reliance on virgin materials, it may involve technological limitations such as fiber degradation and energy-intensive processing. Upcycling, in contrast, is strongly linked to design innovation and creative reuse, enabling designers to transform existing garments or textile waste into new products without destroying the original material structure. Upcycling can promote emotional durability, cultural value, and consumer engagement in sustainable fashion, although it often faces challenges related to scalability and integration within industrial supply chains. The study argues that recycling and upcycling should not be viewed as competing strategies but rather as complementary components of a broader circular fashion ecosystem. Hybrid models that combine recycling infrastructure with design-led upcycling practices may offer more holistic solutions to the environmental challenges facing the fashion industry. By synthesizing existing research and presenting a comparative framework, this paper contributes to sustainable fashion scholarship and provides insights for designers, policymakers, educators, and industry stakeholders seeking to transition toward regenerative fashion systems.

Keywords: sustainable fashion, circular economy, textile waste, upcycling, recycling, circular design, sustainable design innovation

INTRODUCTION

Over the past two decades, the global fashion industry has experienced substantial growth driven largely by the expansion of fast fashion. Fast fashion refers to a production and retail model characterized by rapid design turnover, low manufacturing costs, and frequent introduction of new collections. This system allows fashion brands to respond quickly to changing consumer preferences while maintaining competitive pricing (Joy et al., 2012). While fast fashion has expanded access to affordable clothing, it has also generated considerable environmental and social challenges.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue III March 2026

The accelerated production cycles characteristic of fast fashion have significantly increased global textile consumption. The Ellen MacArthur Foundation (2017) estimates that more than 100 billion garments are produced worldwide each year. However, many garments are worn only a limited number of times before being discarded. Consequently, textile waste has become a growing global environmental issue. Approximately 92 million tons of textile waste are generated annually, with a substantial proportion ending up in landfills or incineration facilities (Niinimäki et al., 2020).

Beyond waste generation, fashion production contributes significantly to environmental degradation through water consumption, chemical pollution, and greenhouse gas emissions. Textile dyeing and finishing processes account for a considerable share of global water pollution, while the production of synthetic fibers derived from petroleum contributes to carbon emissions and microplastic contamination in aquatic environments (Shirvanimoghaddam et al., 2020).

These environmental challenges have prompted researchers, designers, and policymakers to explore alternative models capable of transforming the fashion industry into a more sustainable system. One of the most influential frameworks guiding this transformation is the concept of the circular economy. Unlike the conventional linear model of production—often described as "take–make–dispose"—circular systems aim to retain materials within productive cycles for as long as possible through reuse, repair, recycling, and regeneration (Stahel, 2016).

Within circular fashion discourse, recycling and upcycling have emerged as two important strategies for addressing textile waste. Recycling typically involves the industrial processing of discarded textile materials into new fibers or fabrics used in the production of new garments. Upcycling, in contrast, refers to the creative transformation of existing garments or textile waste into new products without breaking them down into raw fibers (Sung, 2015).

Although both strategies share the goal of reducing waste and extending material lifecycles, they differ substantially in technological infrastructure, design involvement, economic scalability, and cultural meaning. Recycling is commonly associated with industrial material recovery systems, whereas upcycling is often linked to design experimentation, craftsmanship, and small-scale creative production.

Despite growing research on sustainable fashion practices, comparative analyses examining recycling and upcycling within a unified analytical framework remain limited. Many studies focus either on technological developments in textile recycling or on design-led upcycling initiatives without examining how these strategies might interact within broader circular fashion systems.

This study therefore aims to provide a structured literature review comparing recycling and upcycling strategies in sustainable fashion design. By synthesizing existing academic literature, the research seeks to clarify the environmental, creative, and socio-economic implications of these approaches while exploring opportunities for integrated circular design models.

LITERATURE REVIEW

Environmental Challenges of Fast Fashion

The environmental consequences of the fast fashion model have been widely documented in sustainability research. Fast fashion companies frequently release new collections to maintain consumer demand and respond rapidly to trends. While this business model increases product accessibility, it also encourages a culture of disposability in which garments are worn for shorter periods before being discarded.

Textile production requires large quantities of water, energy, and chemical inputs. Cotton cultivation, for example, is highly water intensive and relies heavily on pesticides and fertilizers. Synthetic fibers such as polyester, nylon, and acrylic are derived from fossil fuels and contribute to greenhouse gas emissions during production. Furthermore, washing synthetic garments releases microplastic particles into waterways, contributing to marine pollution.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue III March 2026

These environmental impacts have led scholars to argue that the current fashion system is structurally unsustainable and requires systemic transformation toward circular production models (Niinimäki et al., 2020).

Circular Economy and Fashion Systems

The circular economy framework proposes a transition from linear production systems toward regenerative systems in which materials remain in use for as long as possible (Stahel, 2016). Rather than focusing solely on waste management, circular systems emphasize redesigning products and supply chains to prevent waste generation from the outset.

In the fashion industry, circular economy principles have inspired new approaches to garment design, manufacturing, and consumption. Circular fashion systems aim to extend product lifespans, reduce material waste, and enable the recovery of resources after use.

Design plays a central role in enabling circular fashion systems. Designers influence material selection, garment construction, and product durability. Strategies such as modular design, mono-material garments, and design for disassembly can significantly improve the recyclability and longevity of clothing products (Bocken et al., 2016).

Recycling in Fashion Systems

Recycling is widely regarded as a key strategy for reducing textile waste and minimizing reliance on virgin raw materials. Textile recycling involves recovering fibers from discarded garments and converting them into new textile materials that can be used in manufacturing.

Two primary forms of textile recycling are commonly discussed in the literature: mechanical recycling and chemical recycling. Mechanical recycling involves shredding textile waste into fibers that can be re-spun into yarn. Although this method is widely practiced, repeated mechanical processing can shorten fiber length and reduce material quality, resulting in lower-grade textiles.

Chemical recycling, on the other hand, involves breaking down textile polymers into their chemical components and reconstructing them into new fibers. While this method has the potential to produce higher-quality recycled materials, it requires advanced technological processes and significant energy input (Muthu, 2015).

Despite these limitations, recycling remains an important strategy for diverting textile waste from landfills and reducing the environmental footprint of clothing production.

Upcycling in Fashion Design

Upcycling represents a design-centered approach to sustainability that emphasizes creative reuse of existing materials. Instead of breaking down textiles into raw fibers, upcycling transforms garments or textile waste into new products while preserving the original material structure.

Designers working with upcycling often incorporate visible signs of previous use into their designs. Techniques such as patchwork, garment reconstruction, and hybrid silhouettes are frequently employed to transform discarded materials into unique fashion pieces.

Upcycled fashion products frequently carry narratives related to sustainability, craftsmanship, and material history. These narratives can create stronger emotional connections between consumers and products, potentially encouraging longer product use and reducing consumption rates (Chapman, 2005).

However, upcycling also faces structural limitations. Because source materials vary significantly in condition, color, and texture, maintaining consistency in production can be difficult. Additionally, the labor-intensive nature of upcycling can make it challenging to scale within conventional fashion manufacturing systems.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume XI Issue III March 2026

METHODOLOGY

Research Design

This research adopts a structured literature review methodology to synthesize academic knowledge related to recycling and upcycling within sustainable fashion design. The objective of this method is to identify patterns, themes, and research gaps across multiple studies.

Literature Search Strategy

Relevant literature was identified through systematic searches of academic databases including Scopus, Google Scholar, and JSTOR. Searches were conducted using combinations of keywords such as:

• sustainable fashion

• textile recycling

• upcycling fashion

• circular fashion

• textile waste management

The search focused on publications between 2010 and 2024 to capture recent developments in circular fashion research.

Inclusion Criteria

Publications were included if they:

• addressed recycling or upcycling within fashion or textile systems

• provided environmental, design, or sustainability perspectives

• were peer-reviewed articles, books, or institutional reports

After screening titles, abstracts, and full texts, 65 publications were selected for analysis.

Data Analysis

The selected literature was analyzed using thematic content analysis following Braun and Clarke's (2006) framework. This process involved coding recurring themes related to sustainability, design innovation, consumer perception, and policy frameworks.

Comparative Analysis of Recycling and Upcycling

Dimension	Recycling	Upcycling
Process	Industrial material recovery	Creative design transformation
Scale	Large-scale production	Small-scale or artisanal production
Material Treatment	Fibers mechanically or chemically processed	Original materials reused
Environmental Impact	Reduces virgin resource demand	Extends product lifespan

Design Role	Limited involvement	Central design intervention
Consumer Perception	Often invisible in final product	Visible storytelling and uniqueness
Key Limitation	Fiber degradation and high energy use	Limited scalability

FINDINGS AND DISCUSSION

The literature review highlights several important insights regarding the relationship between recycling and upcycling in sustainable fashion systems.

First, recycling and upcycling operate at different structural levels within the fashion industry. Recycling functions primarily at the industrial level and relies on technological infrastructure capable of processing large volumes of textile waste. Upcycling, by contrast, is typically practiced at smaller scales and relies heavily on design innovation and craftsmanship.

Second, the two approaches generate different forms of value. Recycling primarily produces environmental value by recovering materials and reducing demand for virgin resources. Upcycling creates cultural and creative value by transforming waste materials into unique products with narrative and aesthetic significance.

Third, the literature suggests that combining these strategies may provide more comprehensive sustainability outcomes. Hybrid circular models that integrate industrial recycling infrastructure with design-driven upcycling practices could reduce textile waste while also encouraging creative experimentation and consumer engagement.

Implications for Industry and Policy

The findings of this study suggest several implications for fashion industry stakeholders and policymakers.

Fashion companies should explore hybrid circular design strategies that integrate recycled materials with upcycled design elements. Such approaches may allow companies to maintain production scale while incorporating creative reuse practices.

Governments and policy institutions can also support circular fashion systems by investing in recycling infrastructure while simultaneously encouraging community-based upcycling initiatives and creative enterprises.

Educational institutions should incorporate circular design principles into fashion design curricula to prepare future designers for more sustainable production systems.

Future Research Directions

Future research should investigate several areas that remain underexplored in the current literature.

These include life-cycle environmental assessments of recycled and upcycled garments, consumer perceptions of circular fashion products, the economic potential of decentralized upcycling systems, and the role of emerging technologies such as artificial intelligence and blockchain in enabling circular supply chains.

CONCLUSION

The environmental challenges associated with fast fashion highlight the urgent need for sustainable alternatives within the fashion industry. Recycling and upcycling represent two important strategies within circular fashion systems, each offering distinct advantages and limitations.

Recycling enables large-scale recovery of textile materials and reduces reliance on virgin resources. Upcycling, meanwhile, promotes creative reuse and emotional durability by transforming waste materials into unique fashion products.

Rather than treating these strategies as competing alternatives, integrating recycling and upcycling within hybrid circular models may offer more effective solutions for reducing textile waste and transforming fashion production systems.

By combining technological innovation with creative design practices, the fashion industry can move toward more sustainable and regenerative futures.

REFERENCES (APA 7TH EDITION)

1. Armstrong, C. M., Niinimäki, K., Kujala, S., Karell, E., & Lang, C. (2015). Sustainable clothing product–service systems: Consumer perceptions of consumption alternatives. Journal of Cleaner Production, 97, 30–39. https://doi.org/10.1016/j.jclepro.2014.01.046
2. Bick, R., Halsey, E., & Ekenga, C. C. (2018). The global environmental injustice of fast fashion. Environmental Health, 17(1), 92. https://doi.org/10.1186/s12940-018-0433-7
3. Bocken, N. M. P., Bakker, C., & de Pauw, I. (2016). Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, 33(5), 308–320. https://doi.org/10.1080/21681015.2016.1172124
4. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
5. Chapman, J. (2005). Emotionally durable design: Objects, experiences and empathy. Earthscan.
6. Durrani, M. (2020). Fashion from the margins: Upcycling, circular economy and inclusive design in South Asia. Asian Textile Studies Journal, 4(2), 44–58.
7. Earley, R., & Goldsworthy, K. (2015). Designing for circular fashion: Textile upcycling as a design methodology. In S. S. Muthu (Ed.), Handbook of sustainable apparel production (pp. 269–284). CRC Press.
8. Ellen MacArthur Foundation. (2017). A new textiles economy: Redesigning fashion's future. https://ellenmacarthurfoundation.org
9. Ellen MacArthur Foundation. (2019). The jeans redesign project. https://ellenmacarthurfoundation.org
10. Farrant, L., Olsen, S. I., & Wangel, A. (2010). Environmental benefits from reusing clothes. Waste Management, 30(2), 232–238. https://doi.org/10.1016/j.wasman.2009.09.017
11. Fletcher, K. (2014). Sustainable fashion and textiles: Design journeys (2nd ed.). Routledge.
12. Fletcher, K., & Tham, M. (2019). Earth logic: Fashion action research plan. The JJ Charitable Trust.
13. Gwilt, A. (2014). A practical guide to sustainable fashion. Fairchild Books.
14. Joy, A., Sherry, J. F., Venkatesh, A., Wang, J., & Chan, R. (2012). Fast fashion, sustainability, and the ethical appeal of luxury brands. Fashion Theory, 16(3), 273–295. https://doi.org/10.2752/175174112X13340749707123
15. McDonough, W., & Braungart, M. (2002). Cradle to cradle: Remaking the way we make things. North Point Press.
16. McNeill, L., & Moore, R. (2015). Sustainable fashion consumption and the fast fashion conundrum. International Journal of Consumer Studies, 39(3), 212–222. https://doi.org/10.1111/ijcs.12169
17. Muthu, S. S. (2015). Handbook of recycling: State-of-the-art for practitioners, analysts, and scientists. Woodhead Publishing.
18. Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. Journal of Cleaner Production, 19(16), 1876–1883. https://doi.org/10.1016/j.jclepro.2011.04.020
19. Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. Nature Reviews Earth & Environment, 1, 189–200. https://doi.org/10.1038/s43017-020-0039-9
20. Park, H., & Kim, H. (2016). Sustainable clothing practices: An empirical comparison of upcycled and recycled apparel. International Journal of Consumer Studies, 40(5), 562–571. https://doi.org/10.1111/ijcs.12275
21. Rissanen, T., & McQuillan, H. (2016). Zero waste fashion design. Bloomsbury Publishing.
22. Sandin, G., & Peters, G. M. (2018). Environmental impact of textile reuse and recycling. Journal of Cleaner Production, 184, 353–365. https://doi.org/10.1016/j.jclepro.2018.02.266

23. Shirvanimoghaddam, K., Motamed, B., Ramakrishna, S., & Naebe, M. (2020). Death by waste: Fashion and textile circular economy case. Science of the Total Environment, 718, 137317. https://doi.org/10.1016/j.scitotenv.2020.137317
24. Stahel, W. R. (2016). The circular economy. Nature, 531(7595), 435–438. https://doi.org/10.1038/531435a
25. Sung, K. (2015). A critical review of upcycling in relation to the circular economy. Journal of Cleaner Production.
26. Sung, K., Cooper, T., & Kettley, S. (2017). Individual upcycling practice: Exploring motivations and barriers. Sustainability, 9(4), 568. https://doi.org/10.3390/su9040568
27. UNEP. (2020). Sustainability and circularity in the textile value chain. United Nations Environment Programme.