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CIRCULAR ECONOMY TRANSITIONS IN THE FASHION INDUSTRY: A REVIEW OF SUSTAINABLE PRODUCTION STRATEGIES AND IMPLEMENTATION CHALLENGES

Anzala Suhail
Independent Researcher

Abstract

The fashion industry is among the most resource-intensive global sectors, contributing significantly to environmental degradation through excessive water consumption, greenhouse gas emissions, and large-scale textile waste generation. The dominant linear 'take–make–dispose' production model has intensified sustainability challenges, necessitating systemic transitions toward circular resource use. The circular economy provides a regenerative framework that prioritizes resource efficiency, waste minimization, and closed-loop material flows. This review critically examines the integration of circular economy principles in the fashion industry, focusing on key strategies such as textile recycling, upcycling, eco-design, and the use of sustainable and bio-based materials. It further explores major implementation barriers, including technological limitations, fragmented supply chains, economic constraints, and limited consumer awareness. The study highlights the importance of multi-stakeholder collaboration involving industry, policymakers, and consumers to enable scalable circular transitions. The findings contribute to the discourse on sustainable industrial ecosystems and align with Sustainable Development Goal 12: Responsible Consumption and Production.

Keywords: Circular Economy; Sustainable Fashion; Textile Waste; Resource Efficiency; Green Supply Chains; Industrial Sustainability

Introduction

The fashion industry has experienced rapid global expansion driven by fast fashion consumption patterns. This growth has resulted in increased environmental pressures, including high water usage, chemical pollution, greenhouse gas emissions, and large-scale textile waste generation. A significant proportion of garments are discarded after minimal use, highlighting inefficiencies in the linear production system (Ellen MacArthur Foundation, 2017). As a result, there is growing interest in circular economy models that aim to decouple economic activity from environmental degradation.

Circular Economy in the Fashion Industry

The circular economy is a regenerative system designed to maintain the value of products, materials, and resources for as long as possible. In the fashion sector, it emphasizes durability, reuse, repair, recycling, and redesign to minimize waste generation and extend product life cycles (Geissdoerfer et al., 2017).

Key Circular Strategies

Textile Recycling

Conversion of post-consumer textile waste into reusable fibres and materials, reducing dependency on virgin resources.

Upcycling

Transformation of discarded garments into higher-value products through creative redesign and material reuse.

Eco-Design

Designing garments for durability, repairability, and recyclability to extend product life cycles.

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Sustainable Materials

Use of organic, recycled, and bio-based fibres to reduce environmental impact across production systems.

Implementation Challenges

Despite its potential, circular fashion systems face several barriers: lack of efficient recycling infrastructure, high technological and operational costs, fragmented global supply chains, limited consumer awareness and behavioural resistance, and weak regulatory enforcement in developing economies.

Future Directions

Future progress requires coordinated efforts across stakeholders. Policy interventions, industry innovation, and consumer awareness are essential for enabling large-scale circular transitions. Additionally, digital technologies such as product traceability systems and material tracking can support transparency and circular supply chain management.

Conclusion

The transition toward circular economy models in the fashion industry is essential for achieving long-term environmental sustainability. While significant structural and behavioural challenges exist, integrated multi-stakeholder action can substantially improve resource efficiency and reduce environmental impacts.

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