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Threads of Change: Sustainable Innovation in Fashion

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ABSTRACT

The fashion industry has long been criticized for its environmental and social impact, despite its reputation for pioneering creativity and trendsetting design. As concern about climate change, dubious labor policies and catastrophe amounts of waste grows, sustainable fashion innovation has become a global imperative. The sector is responsible for almost 10% of the world's carbon emissions, using vast amounts of water and generating millions of tons of textile waste each year. These challenges have been exacerbated by the fast fashion model of overproduction, short-lived trends and rapid consumption patterns.

An exploration of sustainable innovation: Making fashion a better place A focus on sustainable innovation involves taking steps to utilize sustainable materials, implementing ethical production methods, promoting circular business models and using tech-based solutions that minimize the ecological footprint while also optimizing social responsibility. Through academic peer-reviewed articles published between 2019 to 2024, this paper explores emerging practices such as biodegradable textiles, up-cycling, slow fashion, and digital production tools, and the impact of changing consumer behaviour on sustainability.

Sustainable innovation — which addresses major environmental concerns while positively impacting labor practices and conscientiously informing consumers — undergirds the research and emphasizes how entrepreneurs can intersect these three fronts. It also delves into what that means for consumers, businesses and policymakers as they strive to make this transition happen. It reiterates that sustainability in the fashion world is not a fad but a fundamental strategy for the long-run leveraging social and timeless environmental consciousness in the age of globalization. The study ends with the recommendations and practical implications concerning the businesses and society to adopt sustainable practices across the fashion value chain. Ultimately, this paper argues that sustainable innovation is the thread that binds fashion with responsibility, leading us toward a more conscious and resilient future.

<u>Keywords</u>: sustainable fashion, innovation in fashion, eco-friendly textiles, consumer perception in fashion, sustainable fashion business models, circular economy in fashion.

INTRODUCTION

Fashion is not just about what you wear, it is a potent expression of your culture, essence, and style. Yet there's a dark side to its glamorous facade: the fashion industry is one of the most polluting industries on the planet. It is a key contributor to carbon emissions, depletes natural resources like water and creates huge amounts of waste. Furthermore, the industry has historically faced criticism for its poor labor practices and exploitative supply chains.

As these challenges grow, so does the call for sustainable innovation in fashion. Sustainable innovation is defined as the application of environmentally friendly materials, ethical manufacturing practices, and circular economy principles into the creation of fashion products and business strategies. Such practices aim to mitigate harmful environmental effects, and encourage transparency and equity throughout the fashion value network. The aim is to create beautiful clothing, but also to do so in a responsible, ethical manner.

The article, "Threads of Change: Sustainable Innovation in Fashion," delves into the major transitions taking place in the world of fashion. And it profiles sustainability not as an add-on, but a foundational value transforming industry standards. Based on extensive literature, this study covers trends like biodegradable fabrics, sustainable business model, eco-conscious customers, and use of technology that will help define the future of fashion. The introduction sets the stage for a deeper understanding of the ways in which sustainable innovation is redefining the fashion industry and steering it toward a greener, fairer, and more responsible future.

REVIEW OF LITERATURE

Fashion brands and consumers approach towards sustainable fashion, Asimananda Khandual, Swikruti Pradhan [2019]

Sustainable fashion is gaining widespread attention as both brands and consumers shift towards eco-conscious choices. It is no longer just a trend but a growing demand driven by educated consumers. International brands like Patagonia, H&M, and Stella McCartney are leading with ethical, transparent practices, while emerging slow fashion labels such as 11.11 and Doodlage focus on fair working conditions, organic materials, and up-cycling. This chapter explores the forms of sustainable fashion, brand strategies, consumer transparency, and the shift from fast fashion to a sustainable, socially responsible approach.

The Knowledge, Attitude, and Practice of the Adoption of Green Fashion Innovation, Alaeddin Ahmad 1, Yasmeen Madi 1, Mohammad Abuhashesh 1, Nawras M. Nusairat 2, Ra'ed Masa'deh 3 [2020]

This study assesses the Knowledge, Attitude, and Practice (KAP) of green fashion innovation adoption in Jordanian garment companies. Using a quantitative approach, data was collected via cross-sectional surveys from 257 managers. The results revealed a significant impact of knowledge and attitude on green fashion innovation adoption, while practice showed no significant effect. This research highlights the role of awareness and attitude in promoting sustainable practices in the Jordanian garment sector and offers insights for practitioners to enhance green initiatives.

The environmental price of fast fashion, Niinimäki, Kirsi; Peters, Greg; Dahlbo, Helena; Perry, Patsy; Rissanen, Timo; Gwilt, Alison [2020]

The fashion industry faces increasing scrutiny for its environmentally damaging supply chain, yet continues to thrive, largely due to fast fashion's reliance on cheap manufacturing and frequent consumption. This review identifies critical environmental impacts across the textile and fashion value chain, highlighting issues such as water use, chemical pollution, CO2 emissions, and textile waste. Annually, the industry produces over 92 million tonnes of waste and consumes 79 trillion litres of water. To address these challenges, fundamental changes in the business model are essential, including reducing manufacturing speed and promoting sustainable practices. An urgent shift back to "slow fashion" is necessary to mitigate environmental damage and enhance the long-term sustainability of the industry.

Natural fibres: Innovative sustainable and eco-friendly, Smita Bhuyan, Nabaneeta Gogoi [2020]

Fashion reflects individual personality, with clothing serving as a means of communication tied to cultural contexts. As consumer preferences evolve, the demand for textile fibres continues to rise, driven by population growth and improving living standards. This trend emphasizes the need to explore natural fibre resources to create safer textile materials. Natural fibres possess unique properties that differentiate them from synthetic alternatives, making them suitable for various applications, including athletic wear and hosiery. Key factors in their manufacturing processes include properties and blending ratios.

Solutions for sustainable fashion and textile industry, Ritu Pandey, Pintu Pandit, Suruchi Pandey, Sarika Mishra [2020]

Sustainable fashion practices are designed to minimize environmental impacts throughout the production, usage, and disposal of clothing, contrasting sharply with conventional methods. The sustainable fashion industry emphasizes products that conserve energy and utilize renewable resources. Ecofashion characteristics depend on the renewability of raw materials, ecological footprints, and chemical processing needs. Textiles labeled as eco-friendly meet rigorous environmental and quality standards, ensuring their recyclability and biodegradability while reducing harmful chemical waste. This chapter explores the increasing demand for eco-friendly solutions in the fashion and textile industries, detailing practices such as eco-innovation, eco-selection, effluent treatment, eco-labeling, and the reuse and recycling of textile waste, along with international regulations related to recycling.

Sustainable fashion: current and future research directions, Amira Mukendi, Iain Davies, Sarah Glozer, Pierre McDonagh [2020]

This paper addresses the fragmented nature of the sustainable fashion (SF) literature within the management discipline, aiming to clarify the path toward a sustainable fashion future. By conducting a systematic review of 465 papers from 2000 to June 2019, the research seeks to unify insights and highlight opportunities for societal impact and future research directions in sustainable fashion.

Sustainable Fashion Through Circular Business Innovations: New Business Models Reduce Waste, Nicole Bassett [2021]

The apparel industry's traditional business model has negatively impacted both people and the planet. A shift towards circular business models presents a significant opportunity for enhancing sustainability in the industry. Unlike the linear economy, which depends on raw materials and often leads to lower wages and unsustainable practices, circular models focus on deriving value from apparel and textiles through innovative approaches such as sharing, product life extension, resource recovery, and product-as-a-service. Leaders in this space are transforming how apparel is bought and sold, contributing to the overall sustainability of the industry.

Marketing sustainable fashion: trends and future directions, Subhasis Ray, Lipsa Nayak [2023]

The fashion industry significantly contributes to greenhouse gas emissions, prompting the rise of sustainable fashion (SF) aimed at creating environmentally responsible products. This paper reviews 97 research papers on SF marketing to identify current trends and future directions. It highlights the emphasis on consumer behaviour and the attitude—behaviour gap in sustainable consumption, while recognizing research gaps in B2B marketing, circular economy, sustainability-oriented innovations, and emerging economies. This study offers insights into sustainable fashion marketing and suggests avenues for future research.

Towards sustainable fashion consumption: An exploratory study of consumer behavior in a developing country, Vina Mohammed, Adrien Razé [2023]

This article contributes to the discourse on consumer behaviour and sustainability in the fashion industry through a case study of consumer habits in the Kurdistan region of Iraq (KRI). Utilizing a hybrid qualitative thematic analysis approach based on 16 semi-structured interviews, the findings present a

conceptual model outlining key barriers to sustainable fashion consumption in KRI and propose strategies to address these challenges. The article provides a foundational framework for researchers, business practitioners, and policymakers to enhance sustainable fashion practices in the region.

Smart Textiles for Sustainable Fashion: Integrating Technology and Eco-Friendly Materials, S.M.Shatarah [2024]

The fashion industry faces significant environmental and ethical challenges due to resource-intensive production and garment disposal practices. This research explores the integration of "smart textiles" as an innovative solution within sustainable fashion. Utilizing a mixed-method approach, including expert interviews and literature reviews, the study highlights the potential benefits, challenges, and opportunities associated with smart textiles. The findings indicate a growing consumer demand for ethical fashion, underscoring the need for the fashion industry to adopt sustainable practices. Ultimately, this research demonstrates the transformative potential of smart textiles to drive positive change in the fashion sector.

Sustainable Fashion after the COVID-19 Pandemic: Environmental Perspectives, Alessia Vacca [2024]

Global pollution is significantly impacted by the fashion industry. It accounts for 10% of greenhouse gas emissions and 20% of wastewater. The fast-fashion industry has worsened the problem by consuming an abundance of plastic in materials. In this chapter, we will discuss the need for the fashion industry to prioritize sustainability, employ circular business models, and create legal frameworks which drive down emissions and plastic waste. While there are no laws specifically regulating sustainable fashion, the law can be a powerful mechanism to drive desired change. The COVID-19 pandemic contributed to the growth of sustainability as emissions decreased during pandemic lockdowns. This chapter will consider the role of legal instruments in changing the fashion industry to operate more sustainably and emphasize the importance of creating legislation that relates to sustainability as we embrace this circular model.

Issues and trends in fashion education sustainability, Sarimah Abu Bedor, Arasinah Kamis, Sharifah Shafie, Farah Najwa Ahmad Puad, Rahimah Jamaluddin, Mohd Bekri Rahim [2021]

This article will provide a review of recent developments in sustainable fashion and textile production from fibre to garment. It is evident that there is a global shift towards sustainable fashion, marked by heightened levels of awareness and increasing consumer demand. However, this trend also requires the participation of multiple stakeholders - not just consumers, but also manufacturers as well as governing bodies. Sustainable fashion will also contribute to improving environmental, social and economic well-being. This paper comprises a review of relevant research articles and prepared a summary of evidence on the major adaptation in garment production processes to deliver more sustainable outputs.

Slow fashion trends: are consumers willing to change their shopping behavior to become more sustainable?, Adrián Castro-López, Victor Iglesias, Javier Puente [2021]

The fashion sector, which is undoubtedly a key driver of economic development, is highly polluting for its linear production process and short product life cycles. Nonetheless, with an increasing societal consciousness regarding the climate crisis, we are seeing a shift towards slow fashion, which is mainly characterized by sustainability/ethicality. This research considers consumer orientation to slow fashion products, their perceived value of it, and their willingness to change behaviour/readjust consumer practices. The findings affirm a consumerisation shift into slow fashion, resulting in facilitating innovation beyond business development and utilising circular economy design principles in the industry.

Educating for change?: An investigation into consumers' perception of sustainability and the educational drivers needed to support sustainable consumption, Kirsty Bennetta, Jemma Oeppen Hill [2021]

This study examines how consumers perceive and understand sustainability within the fashion industry and the role that education plays when considering sustainable consumption. A mixed-method methodology employed quantitative surveys and qualitative interviews to form overall conclusions. Findings suggest most consumers learn about sustainability through social media and documentaries. Although sustainability serves as a motivating force behind purchasing fashion, the price remains a hurdle. This research highlights two suggested recommendations for action, including integrating sustainability education into school curriculums and promoting skills required for making clothing last longer as comprises of action and culture change.

Fashion design education and sustainability: towards an equilibrium between craftsmanship and artistic and business skills?, Monika Murzyn-Kupisz, Dominika Holuj [2021]

Education in fashion design is an essential contributor to sustainability, giving designers the knowledge and expertise to mitigate environmental, economic, social and cultural impacts. This research examined sustainability education in post-secondary fashion schools in Poland, in terms of the confluence of art, craft and business. Lastly, the research identifies challenges, including limited public support for stakeholders in fashion design, and low awareness and education on sustainability among consumers, and concludes with recommendations for curriculum re-assessment to address sustainability on a global scale.

The core value of sustainable fashion: A case study on "Market Gredit", Young Kim, Sungeun Suh [2022]

In this project, the principle of sustainable fashion was analyzed in detail, with a particular focus on Sustainability, a South Korean-based e-commerce platform for eco-brands. Through qualitative data analysis of relevant literature and interviews with sustainability experts, ten keywords related to social and environmental values were developed: eco-friendly, recycled, vegan, up-cycled, zero waste, local, fair trade, women-owned, gives back, and animal protection. Values of sustainable fashion design can help fashion brands define sustainability for consumers and shift the fashion industry toward ethical and environmentally responsible practices.

Sustainability topic trends in the textile and apparel industry: a text mining-based magazine article analysis, Jitong Li, Karen K Leonas [2022]

The primary goal of this investigation is to discover sustainable practices within the textile and apparel industry and to identify gaps and opportunities when undertaking these practices. A text mining process was used to analyze 1,168 magazines published from 2013 to 2020 unveiling several sustainable topics, specifically topics related to sustainability within the environmental, social, and economic dimensions. Most of the focus was within environmental issues as social and economic issues were less discussed. Many gaps were identified that address microfiber pollution, improving consumer knowledge, and enhancing a transparent supply chain. This information provides a valuable avenue for improving sustainable practices in the industry and for future research comparisons.

Mapping environmentally sustainable practices in textiles, apparel and fashion industries: a systematic literature review, Md Mazedul Islam, Patsy Perry, Simeon Gill [2021]

This paper addresses a systematic review of environmentally sustainable practices in the textile, apparel, and fashion (TAF) industries. It reviews 91 peer-reviewed papers published between 2010 and 2020 and maps sustainability practices across different production stages. The review shows that sustainability practices are complex and heterogeneous but notes that there is limited scholarship on upstream sustainability practices such as garment washing, dyeing, and packaging, specifically in developing countries. Overall, the conclusions help to contextualize and advance understanding of environmental practices in the TAF industries, build context for future scholarship, and provide operations-level solutions for managers focused on improving sustainability across the supply chain.

One size fits all? Segmenting consumers to predict sustainable fashion behaviour, Shelley Haines, Seung Hwan Lee [2022]

This research divided consumers into groups based upon their emotions and shopping behaviours to predict sustainable fashion behaviour. Data were obtained using an online questionnaire from a sample of 168 participants were located in the United States. Findings revealed a total of three clusters of consumers: Distressed and Self-Oriented, Warm and Thrifty, and Cold and Frivolous. Each cluster displayed different behaviours towards the consumption and disposal of fashion. The study's segmentation conveys the importance of targeting sustainability towards consumers based on emotion and habits in order to improve consumption of sustainable fashion practices.

Sustainable practice: The future mode of temporality in fashion, Harah Chon [2021]

In this paper, we investigate both time as the mechanism for trend dissemination and adoption of styles across the fashion field, and time as a reflection of society. The ultimate goal is to refine our understanding of temporality within fashion objects through historical research and sustainable practices. By exploring contemporary sustainable design practices, we will demonstrate the impact of time on the creation of meaning of the activities of the fashion system. This essay then engages with the embodied experience of fashion, where the body is a space of social production/design, and time facilitates the evolution of sustainable fashion.

Collaboration practices in the fashion industry: Environmentally sustainable innovations in the value chain, Bruna Villa Todeschini, Marcelo Nogueira Cortimiglia, Janine Fleith de Medeiros [2020]

This research examines the phenomenon of environmentally sustainable innovation in fashion as it relates to stakeholder collaborative processes. A systematic literature review was triangulated with two case studies to examine how drivers and inhibitors of stakeholder collaboration are reorganized to engender outcomes emerging from sustainable innovation. The findings reveal that key drivers for stakeholder collaborative efforts are often influenced by pressures arising from the external and competitive environment, interests in the development of competitive advantage, and co-development of resources.

Sustainable fashion: current and future research directions, Amira Mukendi, Iain Davies, Sarah Glozer, Pierre McDonagh [2020]

This article provides a review of sustainable fashion (SF) research in management, exploring 465 articles published from 2000 to June 2019. The paper identifies two key approaches to SF: pragmatic and radical change. It highlights seven research streams, examining how both organizational and consumer behaviour can be influenced for a sustainable future. The review identifies the gaps in our knowledge to help ground future research and offers insights for practitioners and decision-makers in the SF domain.

The management of sustainable fashion design strategies: An analysis of the designer's role, Stella caxton [2020]

This research examines the ways in which fashion industry design can be managed to facilitate environmental sustainability. The research looks at how fashion firms utilize sustainable processes and the role of the designer in the lifecycle of a sustainable product. A review of literature on circular economy and design management is undertaken, alongside semi-structured interviews with designers and a quantitative survey of designers based in the UK. The results show that designers play a limited role in determining the sustainable strategy, which invariability leads to a model for how to better integrate designers into sustainable the sustainable management of fashion.

Tools for Sustainable Fashion Design: An Analysis of Their Fitness for Purpose, Anika Kozlowski, michal bardecki, cory searcy [2019]

Designing sustainably is not an easy task for designers, and various types of tools have emerged to assist designers in integrating sustainability into their design approaches. In this paper, we identify and analyze such tools by broadly organizing them into three archetypes: Universal, Participatory, and Assessment tools. We also suggest an innovation framework and a fashion-specific five-dimensional model of sustainability for evaluating the tools contextually. The archetypes exist to provide designers with an understanding of appropriate tools based on their own context and needs.

Fashion Brands and Consumers Approach Towards Sustainable Fashion, Asimananda Khandual, Swikruti Pradhan [2019]

Sustainable fashion is now at the forefront of the industry and is identified by brands embracing socially responsible fashion, coupled with increased consumer demand for environmental products. Global brands like Patagonia and Stella McCartney endorse sustainable values alongside new slow fashion brands committed to ethical and transparent practices through artisan designs and organic materials. This chapter explores the forms of sustainable fashion, brand strategies, consumer transparency, and the forces of transition from fast to slow fashion. We will examine how fashion brands and consumers are making progress toward sustainability..

Solutions for Sustainable Fashion and Textile Industry, Ritu Pandey, Pintu Pandit, Suruchi Pandey, Sarika Mishra [2020]

Sustainable fashion practices, by their nature, lessen environmental impact across production, consumption, and disposal, while at the same time, saves energy and natural resources. Eco-fashion textiles are focused on renewed materials; low ecological impact; little chemical use; and availability to be recycled, reused, or biodegradable. This chapter considers the increasing demand for eco-textile solutions in the fashion and textile industry, focusing on sustainable practices such as eco-innovation, recycling, and the management of effluents. Finally, there are international regulations related to recycling and environmental sustainability in fashion and textiles that also will be discussed.

VARIABLES

✓ Independent Variable

Adoption of sustainable innovation (eco-friendly materials, ethical production, recycling practices, circular business models)

✓ Dependent Variable

Reduction in environmental impact (carbon footprint, water usage, textile waste)

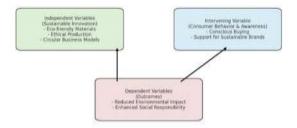
Enhanced Social Responsibility (ethical labour, consumer satisfaction)

✓ Intervening Variable

Consumer behaviour and awareness (conscious buying habits and support for sustainable brands)

CONCEPTUAL FRAMEWORK

Conceptual Framework: Sustainable Innovation in Fashion



OBJECTIVES

- ✓ To reduce environmental impact by exploring eco-friendly materials and innovative practices in fashion.
- ✓ To explore how sustainable practices can minimize the carbon footprints, water usage, and pollution associated with traditional production.
- ✓ To investigate how recycling, up-cycling, and closed-loop systems can reduce waste, encouraging a circular economy in fashion.
- $\checkmark \qquad \text{To understand how consumer demand for sustainable fashion is driving industry changes and promoting long-term sustainability efforts.}$
- ✓ To study the role of innovation in sustainable materials and their applicability in modern fashion.

RESEARCH METHODOLOGY

This study followed a secondary research approach using a comprehensive qualitative literature review, this research examined a collection of peer-reviewed articles and case studies focused on sustainable innovation in fashion, chosen through a non-probability purposive sampling technique. The articles reviewed were published between 2019 and 2024 and obtained from future-oriented sustainable innovations cited in Google Scholar, through the

use of keywords including "sustainable fashion", "eco-friendly textiles", and "circular economy in fashion." The research utilized a descriptive approach to establish information on current trends, eco-materials, circular models, and ethical practices being employed today. This approach allows for a firm conceptual foundation and better insight into how sustainable practices are advancing the fashion industry, and empowering stakeholders of the industry to enact more environmentally friendly practices.

SUGGESTIONS

Based on everything explored in this research, it's clear that the fashion industry is standing at a crossroads. If we really want to see meaningful change, sustainability can't just be a buzz word, it has to be a mind-set! With that being said, here are a few suggestion:

- ✓ Fashion brands should invest more in research and development of eco-friendly and bio-degradable fabrics.
- Transparency in supply chain and ethical labor practices must be adopted and clearly communicated to consumers,
- ✓ Educational campaigns should be conducted to raise awareness about the importance of sustainable fashion among consumers.
- ✓ Government and organizations should provide incentives and support for business adopting sustainable practices.
- ✓ Businesses should also invest in innovation, whether it's in designing circular fashion lines, reducing waste, or using technology like AI and block-chain to track sustainable practices.

Hands down, but - Brands need to start embracing eco-friendly materials not just for marketing, but as a core value. And, let's be real – Fashion has the power to influence! So why not use that power to build a better, greener future?

CONCLUSION

The fashion industry is at a crucial juncture, as there is significant pressure to adopt sustainable practice to reduce its negative environmental impact. I would argue, sustainable innovation for the fashion sector is a requirement and not an optional consideration. The fashion sector is experiencing a critical transition from environmentally damaging practices to eco-friendly practices with the use of eco-positive materials and the implementation of circular business models to fight against social inequality and environmental degradation. Consumers, brands and policymakers each have a role in determining the sustainable future for fashion. Based on secondary research this paper underlines that ethical production, innovative materials and consumer behaviour change are the ways forward. Adopting sustainable innovation will allow the fashion sector to responsibly transition forward, whilst also balancing aesthetics with ethics and profitability with the planet!

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"In every thread of change lies a promise – A promise to wear not just style, but responsibility!"