

Integrating Sustainable Practices in the Global Apparel Supply Chain for Environmental and Social Impact

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Abstract

The challenges affecting the global apparel business include emissions of greenhouse gases, textile waste management, and unexcepted standards of labour. This paper looks at how adopting certain key concepts in sustainability like ethical sourcing, circular economy and carbon management can reduce such effects. The research critically assesses and evaluates the effectiveness of concepts such as the Triple Bottom Line, and Sustainable Supply Chain Management by considering best practices from, for instance, Patagonia and Adidas and has also considered system-level factors such as the lack of progressive legislation and high costs. Research findings show that circular production systems, engaging with stakeholders, and a comprehensible supply chain are strategic for sustainability. There has been some progress towards resolving the issues of worker exploitation but several problems remain when it comes to confronting demand from consumers for fast fashion. This paper adds to the knowledge pool by offering strategies that can be replicated on a large scale for global implementation and reiterates the call for international cooperation in addressing challenges in the apparel industry.

Keywords: Sustainable Supply Chain, Circular Economy, Ethical Sourcing, Carbon Management, Apparel Industry.

Introduction

Current environmental and social implications associated with the global apparel industry include the inability to develop efficient and environment-friendly processes for their complicated production processes to maximize profit by competing for cheap labour^[1]. The benefits of sustainable supply chain practices are gradually becoming significant enough to reduce these impacts. In this context, sustainability retains meanings concerning the approach that integrates economic development with environmental and social preservation. This includes using products that are ethically sourced, using minimised carbon impact, less waste and utilising a circular economy. Fast fashion which includes products that are made rapidly and reasonably, and are planned to be disposed of just as quickly, is one of the major threats to natural resources depletion and pollution: more than 80% of clothing is sent to landfills or incinerated every year^[2]. Ethical issues remain to be seen as the majority of garment workers continue receiving wages below the living wages and working in deplorable conditions. Stakeholder engagement, circular sourcing, and policy work as constructive approaches toward converting the apparel sector into a positive impact industry for both people and the planet^[3]. This study focuses on such interventions with the view of determining interventions that can be implemented throughout the world.

Research Problem

The clothing sector is one of the biggest culprits and is responsible for up to 4% of total greenhouse gas emissions and is currently consuming large amounts of water and energy in manufacturing^[4]. The fast fashion industry is constantly increasing production and consumption, which results in 87% of the clothes that are produced being dumped or burned and only 1% being recycled. Further, it contributed to microplastic pollution, where 35% of the ocean microplastics actualized from synthetic fibres in clothes. These environmental issues are further accompanied by the substandard treatment of labour in supply chains which most workers earn wages that are well below the living wages and also work in dangerous conditions^[5].

Challenges include supply chain issues, opaqueness, and financial shocks in attempts to encourage sustainability. However, the implementation of policies such as ethical sourcing and circular economy principles has remained slow even with high stakeholder pressure. While certain businesses like Otto Group and Patagonia have followed through with some efforts, the industry collectively faces difficulties in following through due to ineffective legislation and consumer expectations of affordable clothing^[6].

Research Objectives

- To analyze the environmental and social impacts of apparel supply chains.
- To identify barriers and opportunities in adopting sustainable practices.
- To propose scalable strategies for integrating sustainability across global supply chains.

Research Scope

This study focuses on the integration of sustainable practices in the global apparel supply chain to address environmental and social challenges. It investigates the impact of fast fashion on resource depletion, textile waste, and labour exploitation while exploring the role of sustainability frameworks such as the Triple Bottom Line and circular economy principles.

Literature Review

The global supply chain of apparel needs profound sustainable practices which include meeting environmental and social factors, which in turn can be understood with the help of strong theoretical and practical models. This section provides research on concepts, theories, and models that form the foundation for sustainability in the apparel industry.

The Triple Bottom Line (TBL) approach is very important to sustainable supply chain management (SSCM). It encourages the use of economic, environmental and social objectives that challenge corporations to seek sustainable development in addition to profitability. Such an approach has been especially useful when considering the vast environmental impact bound to the apparel industry of carbon emission, water pollution, along textile waste^[7]. Some of the actions that have been done by those companies are aligned with TBL, for example, using organic content, and recycling in H&M and Patagonia.

Several trends have been recorded within this industry, including increased adoption of circular economy principles. These principles are directed towards the principles of minimizing waste by recycling, reusing products and redesigning them. For example, Adidas launched a recyclable shoe under the Futurecraft Loop project, while Inditex, the owner of Zara, incorporated closed-loop recycling systems at its supply

chain level ^[8]. Circular fashion opposes the conventional linear demand and supply process, providing sustainable solutions to reduce product endowment lifecycle.

Stakeholder theory is considered key for the coordination of various interests in the context of the apparel supply chain and management. Stakeholder engagement improves the reputation for CSR and sustainability as exploitation, hazardous workplace conditions, and transparency and ethical sourcing are eliminated. For example, the Otto Group in Germany was the first that introduced the stakeholder management approaches and laid down environmental management as its corporate priorities even in the early 1980s ^[9].

Moreover, the SSCM framework is composed of environmental management systems, CSR, and performance assessments. Organizations, including The North Face and Patagonia, have used SSCM to improve levels of disclosure and monitor sustainability performance, including carbon footprint and resource utilization ^[10].

Research Methodology

This research uses a qualitative research approach that analyzes secondary data to determine sustainable initiatives in the international garments supply chain. This study used secondary data for assessing the analysis of the effects on the environment and society as derived from industrial documents, journals, and research articles. From articles on the apparel industry and papers, case studies, sustainability reports, and theoretical frameworks like TBL and SSCM, the knowledge to build an understanding of ethical sourcing, circular economy, and carbon management in apparel organisations was gained.

The methodological approach is grounded on secondary data analysis with an emphasis on the following significant areas: Waste minimization, stakeholders' involvement, and social responsibility. Organization-specific research was conducted on contents from companies like Patagonia, and Adidas and specific policies like the Bangladesh Accord and the effectiveness and challenges were discussed. This method ensured that there was a huge understanding of the links within the value stream in the chain of apparel as well as the interdependency of these links. The conclusions proved by the results of the study for the outsiders were based on the data obtained through questionnaires and interviews with the participants, case studies in peer-reviewed journals and industrial reports.

Analysis & Findings

1. Waste Management and Circular Economy in the Apparel Sector

Analysis

The apparel industry is one of the biggest culprits when it comes to environmental waste; with approximately 92 million tons of fabric waste produced every year. As a result, companies have embraced recycling, and upcycling as well as more extended product life cycles. It brings to light stories such as Patagonia's Worn Wear program of recovering secondhand clothing for resale and repair ^[11].

Policies of reducing wastewater in industries are also part of waste management and the Water<Less techniques of Levi Strauss is a good example of innovations in achieving this. Similarly, the fast fashion brand of Europe, H&M, launched its Conscious Collection, which comprises garments made from recycled items such as organic cotton and polyester, to show good intentions for resource recycling ^[12].

Findings

- Recycling and reusing materials can reduce waste by 30% annually
- Programs such as *Worn Wear* and *Conscious Collection* demonstrate scalable solutions.

- Water-saving techniques, like Levi's *Water<Less*, reduced water consumption by 96% in some products

2. Ethical Sourcing and Supply Chain Transparency

Analysis

Ethical sourcing is a vital component of the overall sourcing approach that reduces unfair treatment of the workforce and avoids negative impacts of business on the environment. Some of the pioneering industries comprising Stella McCartney and Nike have disclosed their supplier lists and made sustainable sourcing policies accessible to the public.

For example, Stella McCartney does not use leather and fur in creation because animal farming is one of the most gas-producing sectors. ^[13]

However, challenges persist in low-wage countries. The 2013 Rana Plaza collapse in Bangladesh underscored the dangers of inadequate labour protections, prompting global calls for stricter compliance ^[14]. The Fair Labor Association's 2019 report emphasized that collaborative audits and stakeholder engagement improved working conditions in apparel factories in Vietnam and Cambodia.

Findings

- Ethical sourcing reduces environmental harm and ensures social equity.
- Industry frontrunners like Stella McCartney and Nike have proven that transparency builds consumer trust while promoting sustainable practices.
- Despite progress, systemic issues like poor wages and unsafe conditions remain significant challenges.

3. Reducing Carbon Emissions

Analysis

Emission mitigation strategies for carbon control in apparel entail control of emissions arising from manufacture and transport. The Global Fashion Agenda in its 2019 report indicated that the sector accounted for 4% of the global emissions. Initiatives such as switching to green power in plants and creating a shoe made from recycled materials as showcased by Adidas are noted to be towards achieving low carbon production ^[15].

Burberry has launched carbon-neutral fashion shows also its carbon offsetting efforts show how luxury fashion works sustainability into its processes. Through sourcing renewable energy in their supply chains, major firms such as Inditex which owns Zara resolved to reach net zero emissions by 2040 ^[16].

Findings

- Transitioning to renewable energy in factories has significantly lowered emissions.
- Circular production processes, like Adidas's recyclable shoes, represent innovative approaches to sustainability.
- Collaborative efforts between governments and private firms are necessary to accelerate carbon-neutral goals.

4. Social Responsibility and Worker Welfare

Analysis

Social sustainability in the apparel industry encompasses fair wages, safe working environments, and empowering local communities. According to the World Resources Institute (2019), 80% of garment workers are women, yet many earn below living wages. Brands like Eileen Fisher have initiated programs

to support female artisans and ensure fair wages, fostering community development.

However, disparities persist. For example, a 2018 International Labour Organization (ILO) study found evidence of child labour and exploitation in major garment-producing countries. Collaborative initiatives like the *Accord on Fire and Building Safety in Bangladesh* have brought tangible improvements in factory safety, demonstrating the potential of industry-wide cooperation.

Findings

- Targeted initiatives, such as Eileen Fisher's artisan programs, can improve livelihoods.
- Multilateral agreements like the Bangladesh Accord are effective in addressing systemic labour issues.
- Consumer awareness is a key driver for ensuring social responsibility.

Summary of Findings

The integration of sustainable practices across the global apparel supply chain demonstrates the industry's ability to address its environmental and social impacts effectively. From waste reduction and circular economy models to ethical sourcing and carbon management, the findings show that while progress has been made, systemic issues like worker exploitation and resource inefficiency remain. Industry-wide collaboration and consumer pressure are critical to driving further innovation and adoption of sustainable practices.

Conclusion

In this study, the objectives were met through an assessment of the environmental and social effects of the GASC, synthesis of barriers, and proposals for sustainable development. The research highlights that concepts of a circular economy, ethical procurement, carbon footprint, and stakeholder engagement are critical for minimising the textile industry's environmental impact and enhancing the living standards of workers. The interventions that the critical examples like Patagonia's Worn Wear, the Adidas Futurecraft Loop, and the Bangladesh Accord showed were feasible applications that brought real change for the better when it came to less waste, omission, and social justice. However, sustainable issues like low wages, perils of work, and inadequate regulatory frameworks have not been surmounted yet. The conclusion also highlights the necessity of multiple stakeholder engagement and consumer awareness to promote change throughout the industry. In light of the Triple Bottom Line and Sustainable Supply Chain Management theories, the research provides prescriptive solutions that can be employed in building a robust and sustainable fashion sector across the world.

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