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Sustainable Fashion through Indian Handloom

Harshita Kureel*

Assistant Professor, Institute of Fashion Technology (IFT), IPS Academy, Indore, Madhya Pradesh, India.

*Corresponding Author: harshitakureel2000@gmail.com

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Abstract

The fashion industry is one of the largest contributors to global environmental pollution due to excessive consumption of natural resources, the rapid growth of fast fashion, and the generation of large volumes of textile waste. These challenges have created an urgent need to adopt sustainable practices within the textile and apparel sector. Among the various sustainable alternatives, Indian handloom fabrics provide an environmentally responsible and culturally significant solution by combining traditional craftsmanship with eco-friendly production techniques. This paper explores the role of Indian handloom in promoting sustainable fashion. Handloom weaving is a low-impact textile production process that requires minimal energy consumption and produces significantly lower carbon emissions than mechanized textile manufacturing. The sector primarily utilizes natural fibres such as cotton and silk, woven through skilled artisanal techniques with limited industrial intervention. Besides its environmental advantages, the handloom industry generates employment opportunities for rural artisans, preserves India's rich cultural heritage, empowers women artisans, and contributes to inclusive socio-economic development. The findings indicate that integrating Indian handloom fabrics into contemporary fashion not only reduces the environmental footprint of the textile industry but also strengthens cultural preservation and promotes sustainable economic growth. The study emphasizes the importance of supportive government policies, increased consumer awareness, and stronger collaboration among designers, artisans, and fashion industries to expand the role of Indian handloom in the global sustainable fashion movement.

Keywords: *Sustainable Fashion, Indian Handloom, Natural Fibres, Textile Waste, Eco-friendly Textiles, Cultural Heritage, Women Artisans, Slow Fashion.*

Introduction

The fashion industry has become one of the fastest-growing industries in the world. While it contributes significantly to economic development, employment generation, and innovation, it is also considered one of the major contributors to environmental degradation. The emergence of fast fashion has encouraged mass production and excessive consumption of clothing, resulting in increased textile waste, depletion of natural resources, greenhouse gas emissions, and water pollution. According to the Ellen MacArthur Foundation, millions of tonnes of textile waste are generated annually, with a substantial portion ending up in landfills or being incinerated. The extensive use of synthetic fibres and chemical dyes further increases environmental pollution and poses serious risks to ecosystems.

Sustainable fashion has emerged as an effective approach to addressing these environmental and social challenges. Sustainable fashion refers to the design, production, distribution, and consumption of clothing in ways that minimize environmental impact while ensuring social responsibility and economic

viability. It promotes the efficient use of natural resources, reduction of waste, ethical labour practices, recycling, and the use of eco-friendly materials throughout the product life cycle.

India possesses one of the richest textile traditions in the world, and the handloom sector plays a vital role in preserving this heritage. Indian handloom fabrics are produced through manual weaving techniques that require little or no electricity, making them significantly more environmentally friendly than mechanized textile production. Unlike powerloom manufacturing, which relies heavily on electrical energy and industrial machinery, handloom weaving uses human skill and traditional techniques, thereby reducing carbon emissions and energy consumption.

The use of natural fibres such as cotton, silk, wool, linen, and khadi further enhances the sustainability of handloom products. These fibres are biodegradable and often processed using natural or low-impact dyes, reducing the discharge of harmful chemicals into water bodies. In contrast, many powerloom industries depend on synthetic fibres such as polyester and nylon, which are petroleum-based, non-biodegradable, and contribute to microplastic pollution.

Another significant environmental advantage of Indian handloom is the comparatively lower generation of textile waste. Since handloom production is generally based on demand and involves skilled manual craftsmanship, fabric utilization is more efficient, resulting in minimal production waste. Conversely, powerloom industries operate on mass-production models where large quantities of fabric remnants and defective materials are discarded during manufacturing. These textile wastes frequently end up in landfills, contributing to environmental pollution.

Indian handloom also plays a crucial socio-economic role by providing employment to millions of weavers and artisans, particularly in rural areas. The sector supports traditional knowledge systems, preserves indigenous weaving techniques, and contributes to women's economic empowerment through home-based and community-based production. In addition to generating livelihoods, handloom products represent India's cultural identity through unique regional weaves such as Chanderi, Maheshwari, Banarasi, Pochampally, Ikat, Patola, and Kanchipuram.

Although numerous studies have highlighted the environmental and cultural significance of Indian handloom, limited research integrates environmental sustainability, textile waste reduction, cultural preservation, and socio-economic development within a single framework. Therefore, this study examines how Indian handloom contributes to sustainable fashion by comparing it with mechanized textile production while highlighting its potential to reduce environmental impacts and promote responsible consumption.

Objectives of the Study

The study aims to examine the contribution of Indian handloom towards sustainable fashion and its potential to reduce the environmental impact of the textile industry. The specific objectives are:

- To study the role of Indian handloom in promoting sustainable fashion.
- To compare the environmental impact of handloom and powerloom production.
- To analyse the use of natural fibres and natural dyes in handloom textiles.
- To examine the contribution of handloom in reducing textile waste and carbon emissions.
- To study the socio-economic contribution of Indian handloom towards artisans, particularly women and rural communities.
- To suggest measures for promoting Indian handloom as a sustainable alternative within the global fashion industry.

Literature Review

Deepati, Singh & Gupta (2019): Deepati, Singh, and Gupta (2019) explored the characteristics of Indian handlooms as a sustainable solution for the fashion industry. The study explains that Indian handloom is deeply rooted in traditional craftsmanship and utilizes environmentally friendly raw materials such as cotton, silk, wool, and natural dyes. Unlike mechanized textile production, handloom weaving consumes minimal energy and generates lower carbon emissions due to its manual production process. The authors further highlight that the handloom sector preserves India's cultural heritage while creating employment opportunities for rural artisans. They also emphasize that promoting handloom products can help reduce the negative impacts of fast fashion by encouraging consumers to purchase durable,

handcrafted, and culturally valuable garments rather than mass-produced clothing. The study concludes that Indian handloom has the potential to become an important component of sustainable fashion through environmental conservation, social inclusion, and economic sustainability.

Dissanayake, Perera & Wanniarachchi (2017): Dissanayake et al. (2017) investigated sustainable and ethical manufacturing practices within the handloom industry. The authors found that handloom production requires significantly less energy than mechanized textile manufacturing and produces considerably lower greenhouse gas emissions. The study also highlights that handloom production encourages zero-waste manufacturing, supports fair trade practices, and provides sustainable employment opportunities for local artisans, especially women. Furthermore, the research emphasizes that slow fashion and ethical production models associated with handloom weaving contribute to environmental protection while improving the economic well-being of artisan communities.

Das & Swain (2025): Das and Swain (2025) examined the sustainability of the Indian handloom sector by analyzing its environmental, economic, and cultural dimensions. The study identifies Indian handloom as an important contributor to sustainable development because it promotes the use of eco-friendly materials, generates rural employment, preserves traditional weaving skills, and supports responsible consumption. The authors also discuss existing challenges such as competition from power loom products, changing consumer preferences, and limited technological support. The study recommends stronger policy interventions, improved marketing strategies, and greater awareness among consumers to enhance the role of Indian handloom in achieving sustainable fashion goals.

Research Methodology

The present study is based on secondary research methodology. Information has been collected from published research articles, books, government reports, journals, conference proceedings, and authentic online databases related to sustainable fashion and the Indian handloom industry. Research papers from Springer, Taylor & Francis, Research Gate, and reports from the Ministry of Textiles, Government of India, were reviewed to understand the environmental, economic, and social contributions of handloom towards sustainable fashion.

The collected information was analyzed qualitatively to compare handloom and power loom production systems in terms of energy consumption, textile waste generation, carbon emissions, dyeing processes, and socio-economic contributions. This study also examines the role of natural fibers, traditional weaving techniques, and artisan-based production in achieving sustainability within the fashion industry.

Discussion

- **Sustainable Fashion and Indian Handloom**

The increasing demand for fashionable clothing has resulted in excessive production and consumption, leading to serious environmental challenges. The fast fashion industry produces garments rapidly at low costs, encouraging consumers to purchase more frequently and discard clothing within a short period. This consumption pattern has significantly increased textile waste, water pollution, carbon emissions, and the depletion of natural resources.

Indian handloom offers an alternative model that aligns with the principles of sustainable fashion. Unlike industrial manufacturing, handloom production focuses on quality, durability, craftsmanship, and responsible resource utilization. Every handwoven fabric reflects the skills of artisans and requires considerably less energy during production.

The use of handloom fabrics promotes slow fashion by encouraging consumers to invest in durable, timeless garments rather than inexpensive, disposable fashion products. As a result, handloom contributes to extending product life cycles and reducing clothing waste.

- **Handloom Versus Powerloom Production**

Handloom and powerloom differ significantly in terms of production techniques and environmental impact.

Handloom weaving is carried out manually using traditional looms operated by skilled artisans. Since the process requires little or no electricity, its carbon footprint is extremely low. In contrast,

powerloom production depends entirely on electrically operated machinery that consumes substantial energy and contributes to greenhouse gas emissions.

Powerloom industries generally produce fabrics in bulk to meet market demand. Mass production often results in overproduction, unsold inventory, and large quantities of textile waste. Handloom production, however, is comparatively demand-based and involves careful planning, thereby minimizing wastage of yarn and fabric.

Table 1: Comparison between Handloom and Powerloom

Parameter	Handloom	Powerloom
Production Method	Manual weaving	Machine weaving
Energy Requirement	Minimal	High electricity consumption
Carbon Emission	Very Low	High
Production Speed	Slow	Fast
Textile Waste	Low	High
Fabric Quality	Unique, durable	Uniform, mass-produced
Employment	High artisan employment	Machine dependent
Sustainability	Highly sustainable	Comparatively less sustainable

The comparison indicates that although powerloom improves production efficiency, handloom remains environmentally superior due to its lower resource consumption and reduced environmental impact.

- **Textile Waste Generation**

Textile waste has become one of the most critical environmental issues associated with the fashion industry. According to the Ellen MacArthur Foundation, millions of tonnes of textile waste are generated annually, with a significant portion ending up in landfills or being incinerated.

Powerloom industries generate waste during spinning, weaving, cutting, finishing, and garment manufacturing. Overproduction caused by fast fashion further increases post-consumer textile waste.

Handloom production generates comparatively less waste because artisans utilize yarn more efficiently and often reuse leftover materials for smaller products such as scarves, bags, cushion covers, patchwork items, and home furnishings. Traditional weaving practices emphasize resource conservation and maximum utilization of available materials.

Consequently, handloom production supports the principles of the circular economy by encouraging reuse, repair, and longer product life.

- **Natural Fibres Versus Synthetic Fibres**

The sustainability of any textile product largely depends upon the raw materials used in its production.

Indian handloom primarily utilizes natural fibres such as cotton, silk, wool, linen, jute, bamboo, and khadi. These fibres are biodegradable, renewable, and require relatively lower environmental impact throughout their life cycle.

In contrast, powerloom industries frequently rely on synthetic fibres such as polyester, nylon, and acrylic. These fibres are derived from petroleum-based resources and are non-biodegradable. During washing, synthetic garments release microplastic fibres into rivers and oceans, contributing to long-term environmental pollution.

The growing preference for natural fibres in handloom products supports sustainable fashion by reducing dependence on fossil fuels and minimizing waste accumulation.

- **Natural Dyes Versus Chemical Dyes**

The dyeing process is another important factor influencing environmental sustainability.

Traditional Indian handloom clusters have historically used natural dyes extracted from plants, flowers, roots, bark, minerals, and insects. Common natural dye sources include indigo, turmeric, madder, pomegranate peel, marigold flowers, and henna. These dyes are biodegradable and produce relatively less harmful wastewater.

Industrial textile manufacturing generally depends on synthetic chemical dyes that contain heavy metals and hazardous substances. During dyeing and finishing, untreated wastewater containing chemicals is often discharged into rivers, causing water pollution and affecting aquatic ecosystems.

Conclusion

The fashion industry has become one of the major contributors to environmental degradation due to excessive resource consumption, rapid production cycles, and increasing textile waste. The growing popularity of fast fashion has intensified these challenges by encouraging frequent consumption and disposal of garments. Consequently, adopting sustainable alternatives has become essential for reducing the environmental impact of the textile and apparel industry.

The findings of this study indicate that Indian handloom offers a practical and sustainable solution to these challenges. Unlike mechanized textile production, handloom weaving requires minimal energy, produces lower carbon emissions, and generates comparatively less textile waste. The use of natural fibres and traditional weaving techniques further reduces dependence on synthetic materials and environmentally harmful production processes. Additionally, the preference for natural dyes in many handloom clusters minimizes water pollution compared to chemical dyeing methods widely used in industrial textile manufacturing.

Beyond environmental sustainability, Indian handloom contributes significantly to socio-economic development by generating employment opportunities, particularly for rural artisans and women. The sector also preserves India's rich cultural heritage through traditional weaving techniques and region-specific textile traditions. By integrating these traditional crafts into contemporary fashion, the handloom industry can simultaneously support sustainable development, cultural preservation, and economic growth.

Although handloom production cannot completely replace industrial textile manufacturing, it can substantially complement sustainable fashion initiatives. Increasing consumer awareness, encouraging responsible purchasing behaviour, strengthening government support, and promoting collaborations between designers, artisans, and fashion industries can significantly expand the role of Indian handloom in the global fashion market.

In conclusion, Indian handloom represents more than a traditional textile sector; it is an environmentally responsible production system that supports sustainable fashion while preserving cultural identity and improving the livelihoods of artisan communities. Its wider adoption can contribute towards achieving environmental sustainability, responsible consumption, and inclusive economic development.

Recommendations

The following recommendations are proposed based on the findings of the study:

- Government agencies should strengthen policies that promote handloom production through financial assistance, marketing support, and skill development programmes.
- Fashion designers should increasingly incorporate handloom fabrics into contemporary apparel collections to enhance market demand.
- Consumers should be encouraged to choose durable handloom products over fast-fashion garments through awareness campaigns.
- Greater emphasis should be placed on the use of natural fibres and natural dyes to reduce pollution generated by textile processing.
- Educational institutions and fashion organisations should promote sustainable fashion practices through workshops, exhibitions, and research initiatives.
- Digital marketing platforms and e-commerce should be utilized to improve market access for rural artisans and increase the global visibility of Indian handloom products.

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