

Sustainable Indian Textiles in the Era of Fast Fashion: Balancing Economic Growth with Environmental and Social Responsibility

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ABSTRACT:

India ranks among the world's top textile producers and exporters, holding a 3.9% share of the global market, contributing 2.7% to the national GDP, and accounting for 35% of export revenues. While the textile sector serves as a major economic engine, the rapid expansion of fast fashion has introduced shorter production cycles and lower costs at the expense of greater environmental and social challenges throughout the supply chain in India. This qualitative research examines how fast fashion has reshaped the Indian textile industry, with particular attention to its environmental footprint, regulatory challenges, and labour implications. This study analyses enforcement gaps in the four Labour Codes (2019–2020), poor traceability beyond Tier-1 suppliers, and the fragmentation of supply chains that characterise the sector. Drawing on international best practices, this study proposes circular economy approaches to promote sustainability, anchoring these recommendations in policy incentives, stakeholder trust-building, consumer education, and robust waste treatment systems. The findings suggest that India stands at a pivotal moment in shaping the future of sustainable textiles by balancing economic progress with environmental stewardship and social inclusion.

Keywords: Indian textile industry, fast fashion, sustainable textiles, circular economy, regulatory framework, labour rights, compliance challenges, social responsibility

1. Introduction

India's textile and apparel industry traces its roots to the ancient Indus Valley Civilisation. Archaeological findings from Mohenjo-Daro and Harappa reveal sophisticated textile production, including spinning wheels and natural dye techniques, demonstrating early mastery over renewable resources. Following independence in 1947, the industry underwent rapid

industrialisation. Traditional khadi and family-owned workshops remained staples, while the sector witnessed the rise of power looms, major spinning mills, and export-oriented manufacturing industries. Government actions, such as developing textile parks and encouraging the use of synthetic fibres, further shaped the industry's trajectory. Today, the Indian textile

sector features a fully integrated supply chain spanning cotton fields in Gujarat, Maharashtra, and Telangana through spinning, weaving, and dyeing to garment production. The coexistence of age-old handlooms and advanced machinery captures the unique blend of tradition and modernity in the sector.

In the financial year 2022, India's textile sector exported goods worth US\$44.4 billion, supporting livelihoods for millions, particularly in rural communities (Noosuwan et al., 2024). However, this strong economic role is increasingly intertwined with growing attention to sustainability as the industry looks ahead. Growth is expected to continue, especially as new sustainability efforts gain momentum, demanding change and setting the context for the sector's evolving challenges and opportunities.

The rise of fast fashion has dramatically reshaped the industry's growth trajectory. Originating in the 1990s with Western retailers, fast fashion has reduced the time needed for new styles to appear in stores from months to just weeks. Typical features include frequent new micro-collections in response to consumer demand, heavy reliance on synthetic fabrics such as nylon and polyester, and aggressive marketing tactics fuelled by social media. Shoppers now enjoy budget-friendly and trendier options driven by social media influence; however, this disposable mindset undermines long-term sustainability. Clothing production has soared to 80–100 billion pieces per year—four times higher than in 2000, with nearly 60% of these garments discarded within a year (Stenton et al., 2021). In India, this fast-fashion trend has flooded urban markets with inexpensive imports, especially from China and neighbouring countries, diminishing the demand for heritage textiles such as handlooms and khadi. Among younger consumers, particularly Generation Z raised on social media, the preference for throwaway fashion has increased by 40% (Siregar et al., 2023). This noticeable shift in consumer shopping habits has both driven and facilitated the decline of traditional weaving, which was once a cultural cornerstone. The environmental impact of fast fashion expansion is profound and wide-ranging. Textile manufacturing is responsible for approximately 10% of global carbon emissions,

about 1.2 billion tonnes of CO₂ annually, surpassing combined emissions from international aviation and shipping (Ellen MacArthur Foundation, 2017). The textile and clothing sector uses vast amounts of non-renewable resources, totalling approximately 98 million tonnes annually (United Nations Environment Programme, 2019). Wastewater from textile factories represents another major concern. Recycling remains at a bare minimum, and what remains often carries harmful substances such as azo dyes, heavy metals, and perfluorinated compounds, threatening ecosystems and public health over time. India, as a key player in global textile production, magnifies these challenges. The country produces dry municipal solid waste, with less than 30% recycled into yarn (Patel et al., 2022). This industry uses staggering amounts of water—studies indicate that a single cotton T-shirt requires approximately 2,700 litres, and a pair of jeans nearly 7,600 litres—with textile and clothing hubs using more than 16 million litres daily (Goaied, 2025).

Socially, the textile and clothing sector is highly labour-intensive, with more than half its workforce being women, creating particular vulnerabilities under the pressures of fast fashion. Supply chains become more complicated with subcontracting, making them less transparent and increasing the risk of poor working conditions. Labour issues such as sweatshops, forced labour, hidden child labour, and depressed wages remain widespread. Many textile and clothing workers earn only the minimum wage, often trapping families in poverty cycles and falling short of the goals outlined in Sustainable Development Goal 8, which calls for decent work and economic growth. Furthermore, economic, social, and environmental challenges in the sector are tightly interwoven, requiring nuanced examination to understand the impact of fast fashion in India. This study addresses a fundamental question: How can India's textile sector balance the rapid pace of fast fashion with the need for environmental and social responsibility? This study examines how

sustainability can serve as a guiding force across all industrial operations in the textile sector. In the past, hand-spun yarn symbolised India's independence movement, but today, export-oriented factories and high-speed looms reflect a sector in constant flux, driven by the rise of fast fashion and marking a pivotal shift. This drive to capture market share and create jobs must now be weighed against rising environmental and social costs. Although synthetic fibres are cost-effective, the growing preference for them has edged out traditional cotton and handlooms, reshaped sourcing strategies, and introduced new forms of pollution. This change is both cultural and technical, gradually eroding the skills and heritage in India's artisanal dyeing and weaving. The remainder of this paper is organised as follows. Section 2 provides a detailed examination of fast fashion in the Indian textile and clothing industry, exploring its conceptual evolution, market penetration, financial imperatives, and supply chain fragmentation. Section 3 analyses the environmental impact of fast fashion, including carbon and resource footprints, water and effluent crises, waste and microplastics, and effects on biodiversity and soil. Section 4 addresses labour exploitation under fast fashion, covering wage suppression, gendered vulnerabilities, child and bonded labour, and health and safety deficits. Section 5 discusses additional environmental consequences of the Indian textile sector beyond fast fashion, including legacy pollution, recycling inefficiencies, and energy intensity. Section 6 presents pathways to sustainability practices, including material substitution, process innovation, and circular economy approaches. Section 7 evaluates the regulatory framework and compliance challenges, examining legislative architecture, enforcement gaps, and relevant court precedents. Section 8 reviews global good practices and proposes an India-specific policy roadmap. Section 9 concludes the paper with key findings and recommendations for achieving long-term sustainability in the Indian textile sector.

2. Materials and Methods

2.1. Research Design and Approach

This study adopts a qualitative research design to

examine the multifaceted relationship between fast fashion and sustainability within the Indian textile industry. The qualitative approach is particularly suited to this investigation as it allows for in-depth exploration of complex social, economic, and environmental phenomena that cannot be adequately captured through quantitative measures alone. The research employs document analysis as its primary methodological strategy, drawing upon a wide range of secondary sources, including government reports, legal documents, industry publications, academic journal articles, and non-governmental organisation reports.

The qualitative document analysis approach enables the researcher to critically examine existing textual materials to identify patterns, themes, and insights relevant to the research question. This methodology is appropriate for studying the Indian textile sector given the availability of extensive documentary evidence spanning regulatory frameworks, industry practices, environmental data, and social impact assessments. This approach aligns with established qualitative research traditions that emphasise the interpretation of existing texts to generate new understandings of contemporary issues.

2.2. Data Sources

The study draws upon multiple data sources to ensure comprehensive coverage of the topic. Primary data sources include:

i. *Legislative and Regulatory Documents*: The analysis incorporates the examination of India's four labour codes (2019–2020), including the Code on Wages (2019), the Industrial Relations Code (2020), the Code on Social Security (2020), and the Occupational Safety, Health, and Working Conditions Code (2020). Environmental legislation, such as the Water (Prevention and Control of Pollution) Act, the Air (Prevention and Control of Pollution) Act, the Environment (Protection) Act, the Plastic Waste Management Rules (2016), and the Hazardous Waste (Management and Handling) Rules (1989), is also analysed.

ii. *Judicial Decisions*: The study examines key court

precedents from the Supreme Court of India, including *Vellore Citizens Welfare Forum v Union of India* (1996), *M.C. Mehta v. Union of India* (1992), *Radhakanta Nayak v. State of Odisha* (1992), and *People for the Ethical Treatment of Animals (PETA) India v. Union of India & Ors* (2020). These judicial pronouncements provide important legal interpretations of environmental and labour principles relevant to the textile sector.

iii. Government and Regulatory Reports:

Documents from the Central Pollution Control Board (CPCB), State Pollution Control Boards (SPCBs), and Ministry of Labour and Employment are key data sources. These include compliance assessment reports, air quality studies, and policy-implementation documents.

iv. *Industry and Academic Publications*: Peer-reviewed journal articles, industry reports, and publications from organisations such as the Ellen MacArthur Foundation, Textile Exchange, and the United Nations Environment Programme provide empirical data and analytical frameworks for understanding the environmental and social dimensions of fast fashion.

v. Non-Governmental Organisation Reports:

Reports from organisations such as the Tiruppur People's Forum and other civil society groups offer grassroots perspectives on community health impacts and industry practices.

2.3. Data Collection and Analysis

The data collection process involved the systematic identification and retrieval of relevant documents from publicly accessible sources. Academic articles were sourced through established scholarly data, "regulatory framework," "labour rights," and "compliance challenges". Government documents and legal materials were accessed through official ministry websites and legal databases.

Data analysis followed the established qualitative analysis procedures. Thematic analysis was employed as the primary analytical framework, involving the systematic coding of textual data to identify recurring themes, patterns, and relationships. The analytical process proceeded through the following steps:

i. *Familiarisation*: All documents were read thoroughly to gain a comprehensive understanding of the content and context. Initial impressions and key concepts were noted.

ii. *Coding*: Relevant passages were coded according to thematic categories derived from the research question and emerging from the data. The codes included environmental impact, labour exploitation, regulatory compliance, supply chain fragmentation, policy responses, and international best practices.

iii. *Theme Development*: Related codes were grouped into broader thematic categories that formed the major sections of this paper. The themes were refined through an iterative review and comparison of the data sources.

iv. *Synthesis*: Thematic findings were synthesised to develop a coherent narrative addressing the research question. The relationships between themes were examined to identify connections and contradictions.

v. *Interpretation*: The findings were interpreted within the context of the existing literature and theoretical frameworks, with attention to their implications for policy and practice in the Indian textile sector.

2.4. Validity and Reliability

To enhance the validity and reliability of the findings, this study employs multiple strategies. Triangulation of data sources—including government documents, academic literature, legal materials, and NGO reports—provides cross-verification of key findings. The use of diverse source types reduces the risk of bias inherent in any single data source. Additionally, the analysis maintains a transparent and systematic approach to document selection and interpretation, allowing for auditability of the research process.

This study acknowledges the limitations inherent in document-based qualitative research. The analysis is dependent on the availability, accuracy, and completeness of secondary sources. Where discrepancies or gaps in available data exist, these are noted in the relevant sections of the paper. Furthermore, the findings

reflect the period covered by the available documents and may not capture the most recent developments in the sector.

2.5. Ethical Considerations

As this study did not involve human participants, standard ethical considerations regarding informed consent and participant confidentiality did not apply. However, the study maintained ethical standards in document analysis through accurate representation of source materials, proper attribution of ideas, and avoidance of misrepresentation or selective citation. All sources are fully referenced to allow readers to verify the basis of the study's claims and conclusions.

3. Fast Fashion in the Indian Textile and Clothing Industry

3.1. Conceptual Evolution and Market Penetration

Fast fashion relies on planned obsolescence, designing clothes to wear out quickly and encouraging shoppers to return more often for new items aligned with the latest trends. The Inditex group, with brands like Zara, pioneered this approach by reducing the design-to-store process from several months to just two to three weeks, achieving this speed through just-in-time manufacturing, data-driven trend forecasting, and vast global sourcing networks (Arrigo, 2021). Indian retailers, such as Reliance Trends and Myntra, along with international giants such as H&M and Shein, soon adopted similar tactics and can now roll out new collections weekly based on consumer interest. This repetitive cycle is further fuelled by e-commerce and social-media algorithms, which push the latest styles directly to users' feeds.

Synthetic fibres now dominate India's textile industry, outpacing natural alternatives such as silk, cotton, jute, wool, and coir. Polyester accounts for 60% of total fibre use, a sharp jump from 40% in 2010, driven by affordability—approximately INR 80 per kilogram versus INR 220 for cotton—and practical benefits, such as wrinkle resistance and quick drying (Textile Exchange, 2023). However, this trend is eroding India's long-standing prominence in cotton production and undermining traditional natural-dye practices among artisans

(Textile Outlook International, 2022). Synthetic fibres fit fast fashion's focus on low-cost production and novelty; however, they link the industry to environmental degradation, as synthetic fibres complicate recycling and take time to biodegrade.

3.2. Financial Imperatives versus Externalities

While fast fashion has played a major role in boosting the textile industry's GDP growth—contributing as much as 15 to 20 percent through expanded market reach and increased consumer demand—its true costs are steep and wide-ranging. The business model of fast fashion is deliberately built on disposability, with most garments worn only five to seven times before being discarded. This contrasts starkly with traditional clothing, which typically lasts for 50 or more wears owing to superior craftsmanship and materials (Niinimäki et al., 2020). The rise of disposable fashion is evident in today's shopping patterns: annual per-capita clothing consumption has increased by 18 pieces, with 65% of those being synthetic items bought for style rather than longevity (Lanza, 2024).

India's textile industry structure is further disrupted by imports. China, for example, supplies 70% of the polyester yarn and 40% of the finished garments sold in India, leveraging economies of scale to undercut local micro, small, and medium enterprises (MSMEs) by 30–50% (Singh, 2023). This surge of inexpensive, often lower-quality products has flooded the Indian market and hit traditional artisan clusters hard: places like Chanderi, Banaras, and Kanchipuram have witnessed revenue drops and shifts in their customer base toward mass-produced imitations. In this vicious cycle of fast fashion—while a surge can be seen in job creation and temporary export boosts—its long-term impact is much more detrimental, potentially resulting in the loss of traditional knowledge and disintegration of skilled labour markets.

3.3. Supply Chain Fragmentation

India's textile supply chain is largely fragmented,

with approximately 3.5 million handlooms, 0.6 million power looms, and approximately 45,000 garment units—90% of which have fewer than 50 workers and operate outside formal regulatory frameworks (Begum & Das, 2017).

Subcontracting is common, as Tier-1 textile suppliers (typically large exporters) often outsource production to smaller Tier-3 textile units that lack infrastructure to support environmental compliance, including effluent treatment, water-use monitoring, land-contamination control, and adherence to proper labour standards. This fragmentation makes it difficult to trace practices beyond Tier-1 suppliers, and brands often take advantage of commercial secrecy to shield themselves from accountability further down the chain. Tier-3 textile units, because of their informal nature, often use cost-cutting practices that not only impede efficient resource use but also hinder compliance with environmental and labour standards.

The growth of fast fashion has deepened fragmentation in India's textile supply chain. Suppliers now face relentless pressure to deliver larger volumes at ever-faster speeds, often at the expense of sustainability. Meeting tight deadlines frequently requires sweeping changes that can weaken compliance systems and distract from both quality assurance and fair labour practices (Patel, 2023). Overreliance on imported synthetics further disrupts local spinning mill stability and domestic cotton use, exposing the textile industry to global competitive pricing, which threatens local stability and affects rural economies.

4. Environmental Impact of Fast Fashion

4.1. Carbon and Resource Footprint

The carbon footprint of fashion merchandise, particularly fast fashion, is between 8% and 10% globally. In India, textile hubs in Amroha, Panipat, and Bhojpur play pivotal roles in textile waste generation and recycling. The textile cluster of Panipat alone manages more than half of India's textile waste via "downcycling"—converting textile waste into products of lower value—yet faces acute sustainability challenges. A case in point is Tiruppur, commonly known as the “Knitwear Capital of India.” The city's textile cluster alone

produces over 400 million garments annually, but at considerable environmental cost (Raghavan, 2024). According to a 2024 study by the Central Pollution Control Board, air quality indices in Tiruppur regularly exceed safe thresholds, largely due to coal-based energy used in textile production. Local NGOs, such as the Tiruppur People's Forum, have documented increased respiratory illness rates among community residents, linking them to emissions from dyeing and finishing units (Iyer, 2024; Tiruppur People's Forum, 2024; Central Pollution Control Board, 2024). Efforts to shift toward sustainable energy sources, such as transitioning to solar or wind power, have begun in select industrial parks, but the pace of adoption remains slow owing to high upfront expenses and restricted state incentives.

There is an acute need for energy transition and the adoption of cleaner production technologies in the textile and clothing sector to reduce the environmental footprint of fast fashion in India.

4.2. Water and Effluent Crisis

The fast fashion industry is acknowledged as the second most water-intensive industry, with annual water usage exceeding 79 trillion litres, accounting for approximately 20% of industrial wastewater. In India, across its textile clusters, water usage per tonne of cotton cloth in wet-processing is double the best-practice benchmark. Strict environmental regulations, such as mandatory treatment systems and, in some cases, zero liquid discharge (ZLD), are in place in major textile clusters such as Tiruppur, Surat, Panipat, Ludhiana, and parts of Gujarat. Initiatives during manufacturing, such as efficient dyeing technologies, water usage and reuse, ZLD, and advanced waste treatment systems, can help mitigate these challenges. Moreover, encouraging textile clusters to conduct detailed annual water audits to understand usage and effluent discharge can further avert the water and effluent crisis.

4.3. Waste and Micro-plastics

The production of 92 million tonnes of textile waste per year makes India the third-largest producer of municipal solid waste (Kapoor,

2022). Cutting and sewing activities generate pre-consumer waste, accounting for 15–20% of this total, while post-consumer waste—a consequence of fast fashion disposability—accounts for the remainder. Only 1% of waste is formally recycled, with 75% either landfilled or incinerated, releasing methane and toxic ash. Furthermore, when polyester fibres are washed, approximately 0.5 million tonnes of microplastics flow into Indian waterways, polluting marine ecosystems and entering human food sources (Stanescu, 2021).

4.4. Impact on Biodiversity and Soil

Cotton cultivation, a key upstream component of the supply chain, accounts for half of India's pesticide use, resulting in soil degradation and declining productivity over time. Water bodies become eutrophicated due to pesticide runoff, disrupting aquatic biodiversity and depleting oxygen levels in rivers. Additionally, converting eucalyptus plantations to viscose production results in deforestation of 100,000 hectares annually, fragmenting habitats and diminishing the carbon-absorption capacity of forest ecosystems (Bäck et al., 2017). Fast fashion in India has significant environmental consequences throughout the entire supply chain, impacting air quality, water resources, soil health, and biodiversity. The sector's substantial carbon emissions, water pollution, high waste levels, and contribution to biodiversity loss highlight the shortcomings of current industry practices, underscoring the urgent need to adopt environmentally sustainable technologies and circular production models.

5. Labour Exploitation under Fast Fashion

5.1. Wage Suppression and Precocity

Fast-fashion supply chains often pay garment workers daily wages of ₹143-157, which is 40% below established living wage standards (Khurana & Muthu, 2022). Workers are paid on a piece-rate system, with long shifts of 143-157 hours. The threat of job loss forces overtime in Indian fast-fashion textile clusters, despite the Code of Wages (2019) mandating minimum wages as statutory compliance. Yet, informal practices and contract loopholes persist because of the informal structure of textile mills.

5.2. Gendered Vulnerabilities

In the textile and clothing sector, gender hierarchies are evident: 70% of garment workers are women, yet fewer than 5% hold supervisory roles. Sexual harassment in factories has been reported, including verbal and physical abuse. Maternity leave often leads to the dismissal of impacted employees, directly contravening the provisions of the Code on Social Security (2020), which aim to safeguard reproductive rights and employment security.

5.3. Child and Bonded Labour

The fast fashion sector continues to grow annually, with child labour a by-product that many fashion brands prefer not to be associated with. The complex nature of the fast fashion industry's supply chain forms one of the main challenges to tracing the risks of child labour throughout a brand's production process. Most child labour occurs in stages of the industrial process that can be easily overlooked, further down the supply chain. In the textile clusters of southern India, specifically in Coimbatore/Tirupur, the Sumangali scheme allegedly exploits young women workers through advance payments that subject women of marriageable age (between 21 and 23 years) to 143-157-year contracts under conditions of debt, representing an example of hidden forced bonded labour in the Indian textile and clothing industry.

5.4. Health and Safety Deficits

In the Delhi-NCR textile and clothing clusters, compliance with fire safety standards is at a bare minimum, increasing the risk of disastrous events similar to previous factory fires. Moreover, lung diseases such as byssinosis among workers in spinning mills are common owing to prolonged exposure to cotton dust, while dye chemicals cause dermatitis and respiratory problems in workers. Labour exploitation in the fast fashion market takes the form of wage discrimination and suppression, discrimination against women, child and bonded labour, and serious health hazards. These problems trap families in cycles of poverty and insecurity, making it difficult for the sector to

achieve sustainable social sustainability.

6. Environmental Consequences of the Indian Textile Sector: Beyond Fast Fashion

6.1. Legacy Pollution

Coal boilers built between the 1960s and 1990s were often installed without scrubbers, with one-fourth still operational today in India's textile clusters, releasing pollutants into the air. Older forms of dyes, such as sulphur and vat compounds, have a 50-year half-life of 50 years in groundwater aquifers and continue to pollute drinking water sources, even in industrial areas (Policy et al., n.d.).

6.2. Recycling Inefficiencies

Textile waste, identified mainly as pre-consumer and post-consumer waste, faces recycling inefficiencies in industrial practices. In Panipat, the Shoddy industry, also known as the global textile recycling capital, has achieved success in textile waste recycling. Waste, mostly in the form of second-hand clothing, is recycled into low-quality products, such as blankets, shawls, and carpets. The garments are sorted, opened, and broken up into fibrous mass on garneting machines, with fibres then dyed, carbonised, and converted into woollen spun yarns from which blankets are made. Yet, inefficiencies persist, as the industry lacks effective water treatment and bleaching treatment systems, continuing to threaten ecosystems, public health, and livelihoods.

6.3. Energy Intensity

Spinning consumes 143-157 kWh/kg of yarn, with a high consumption of 143-157 kWh/kg during wet processing. Renewable energy uptake is low, with only 15% of units using solar or wind energy in their operations (Bureau of Energy Efficiency, 2023; Goyal & Nayak, 2020). Outside the fast-fashion paradigm, the Indian textile industry faces decades of pollution, recycling bottlenecks, and energy requirements that necessitate specific interventions to ensure effective environmental management.

7. Pathways to Sustainability Practices

The initial source of sustainable practices is material substitution. This starts with a clear target of extending the Better Cotton Initiative coverage to

50% by 2030 (currently at 25%) and the compulsory introduction of 20% recycled polyester (rPET) into government uniforms, which would trigger demand for post-consumer recycling and lessen reliance on synthetic materials. Process innovation also increases efficiency. 3D software, such as CLO and Browzwear, can eliminate physical prototyping by 80%, thereby reducing emissions from these stages by 30% (Habib et al., 2025). Waterless dyeing technologies, such as CO₂ and plasma technologies, consume up to 95% less water during colouring processes than traditional processes, representing one of the most urgent resource issues in the sector (DyeCoo, 2023). Scaling up the Zero Discharge of Hazardous Chemicals (ZDHC) programme, which today has more than 500 members in India, to 5,000 by 2028 should be used to gradually eliminate toxic substances from the supply chains (Rápó & Tonk, 2021). The online fashion rental market, through seed funding initiatives, is growing and valued at 3–4 billion US dollars. Rental websites such as Rent the Runway, Stage3, Flyrobe, and The Clothing Rental are already established players, prolonging garment lifespans through shared use, encouraging conscious consumption, and capitalising on consumer preference for second-hand clothing. By founding 50 upcycling centres in Tiruppur, it is possible to transform 10,000 tonnes of scrap into valuable products every year, fostering local entrepreneurship (Mishra, 2024). However, this acceleration requires government support. A comprehensive approach that combines material innovation, process improvements, circular economy strategies, and supportive policy measures can guide the Indian textile industry toward greater sustainable practices. By aligning technological advancements with environmental stewardship and social responsibility, the sector can address its most pressing challenges and move toward a more sustainable future.

8. Regulatory Framework and Compliance Challenges

8.1. Legislative Architecture

The regulatory framework for sustainability in

India's textile sector is defined by a network of laws, including the Water (Prevention and Control of Pollution) Act, the Air (Prevention and Control of Pollution) Act, the Environment (Protection) Act, and the Zero Liquid Discharge Policy (Rao & Srivastava, 2023). A major recent development is the codification of 29 central labour laws into four Labour Codes: the Code on Wages (2019), the Industrial Relations Code (2020), the Code on Social Security (2020), and the Occupational Safety, Health, and Working Conditions Code (2020). These codes aim to streamline compliance, extend social protection, and modernise industrial relations, with direct implications for the country's textile and clothing sectors. The Code on Wages (2019) sets a national floor wage, establishes regular revision mechanisms, and aims to address wage disparities. In the textile industry, this is intended to standardise pay, but enforcement remains difficult in unregulated and subcontracted units where many garment workers remain outside the formal wage system (Ministry of Labour and Employment, 2020). The Industrial Relations Code (2020) simplifies industrial dispute resolution and changes the thresholds for layoffs and retrenchments. While designed to promote industrial harmony, the increased threshold for prior government approval of layoffs might, in practice, make it easier for employers in smaller units to reduce their workforce, affecting job security in MSMEs (Ministry of Labour and Employment, 2021a). The Code on Social Security (2020) brings together provisions for provident fund, gratuity, maternity benefit, and social insurance, extending coverage to gig and unorganised sector workers. In theory, this widens the social safety net for millions in the apparel industry; however, practical difficulties persist in registering informal workers and guaranteeing employer compliance across fragmented supply chains (Ministry of Labour and Employment, 2021b). The Occupational Safety, Health and Working Conditions Code (2020) mandates workplace standards for safety, working hours, and welfare. It should drive improvements in factory safety and worker health in large units; however, many small and informal units remain outside effective oversight due to coverage thresholds (Ministry of Labour and Employment, 2021c).

While these labour codes promise streamlined regulation and greater worker protection, the industrial colonial structure of the mills, persistent informality, subcontracting, and a lack of traceability in India's textile and fast fashion mills act as barriers to the codes' potential to improve wages, safety, and social security. Without effective enforcement of the Code, digital compliance tracking, and worker awareness of their rights, the Code will remain a paper provision for this fast-growing sector.

There is no specific legislation governing or regulating sustainable fashion in the country as of yet. Therefore, textile and clothing brands are governed by eight major sustainability laws, such as the Water, Air, and Environment Protection Act; 23 laws in the sphere of commerce; four consolidated Labour Codes of 143-157; and consumer protection legislation. The Occupational Safety, Health, and Working Conditions Code consolidates 13 preceding laws into 134 simplified sections, making compliance with one-time establishment registration easier. Despite this centralisation, more than 70% of MSMEs operating as textile and fast-fashion mills are not registered under the "Udyam" Scheme of the Government of India and therefore easily evade compliance with the above-mentioned legislations. Moreover, textile and clothing brands must obtain valid environmental permits from the Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs), which are accountable for manufacturing units, particularly in tanning, dyeing, and printing, where water sources are used and pollutants are emitted in large quantities. Regarding packaging, strict adherence must be made to the Plastic Waste Management Rules, 2016, and the Hazardous Waste (Management and Handling) Rules, 1989, if textile and clothing brands resort to manufacturing processes that emit hazardous residues.

8.2. Enforcement Gaps

Despite closure notices issued to non-compliant textile and fast fashion units annually by the Central Pollution Control Board, compliance

bottlenecks remain a structural challenge. Illegal sub-textile units, corruption, and monitoring backlogs surface as enforcement gaps. Lower-tier informal textile units remain largely unchecked, allowing many labour violations, and subcontracting agreements allow major textile units and brands to dissociate themselves from Tier-2 and Tier-3 malpractices, avoiding direct liability for worker safety and labour violations in their deeper supply chains.

A striking example is the Panipat textile cluster, where frequent non-compliance with effluent discharge norms has led to repeated closure orders, but many units resumed operations without meaningful remediation, aided by weak follow-up enforcement (Central Pollution Control Board, 2023). Unannounced inspections of textile units are uncommon, and textile factory owners commonly exploit regulatory loopholes and secure temporary stays through legal appeals. This pattern is common in other textile hubs, such as Ludhiana and Bhilwara, where informal units outnumber formal ones and routinely bypass environmental and labour regulations.

Internationally, countries such as Bangladesh have illustrated the effectiveness of independent third-party audits and transparent digital compliance-tracking systems (Limon, 2023). Lessons from these contexts suggest that deploying live monitoring technologies and increasing penalties for repeat violations could substantially improve compliance rates in India. Strengthening whistleblower protections and incentivising worker participation in compliance oversight would further close enforcement gaps.

8.3. Court Precedents

In *Vellore Citizens Welfare Forum v Union of India* (1996), the Supreme Court of India laid down the principles of the polluter pays and the precautionary principles, expressly acknowledging "sustainable development" as part of law, thereby making industries embrace more efficient technologies and imposing remediation costs for environmental damage (*Vellore Citizens' Welfare Forum v Union of India*, 1996). Similarly, in *M.C. Mehta v. Union of India* (1992) (also known as the Tanneries Case), effluent treatment plants were

required to be installed in polluting industries, with the Supreme Court imposing a duty on industries to implement adequate waste treatment techniques, extending to textile industries (*M C Mehta v Union of India*, 1992). In *Radhakanta Nayak v. State of Odisha* (1992), the Court imposed strict adherence to waste disposal procedures for textile dyeing units to prevent environmental degradation and imposed definite legal liability on the fashion and textiles business for environmental pollution (*Radhakanta Nayak v. State of Odisha*, 1992). In *People for the Ethical Treatment of Animals (PETA) India v. Union of India & Ors* (2020), the Supreme Court of India emphasised responsible procurement of fashion items as a key component of sustainability and banned the use of skin of exotic animals in fashion, thus protecting and strengthening animal rights in the sector (*People for the Ethical Treatment of Animals (PETA) India v Union of India & Ors*, 2020).

Although there is a comprehensive regulatory framework and clear judicial mandates, significant enforcement gaps continue to exist at the implementation level. While judicial decisions are progressive, stronger enforcement is required to ensure compliance and advance sustainability objectives.

9. Global Practices and Policy Roadmap

9.1. Benchmarks

The EU Strategy on Sustainable Textiles (2022) places strong emphasis on eco-design, digital product passports for traceability, and bans on the destruction of unsold stock to reduce waste. One standout feature is the demand for manufacturers to provide clear, detailed information on fibre content, durability, and repair options—helping shoppers choose greener products. The EU's Extended Producer Responsibility (EPR) policy also requires brands to fund the collection, sorting, and recycling of used textiles, pushing the industry toward circular business models.

France's Anti-Waste Law (2020) is the first legal ban on the destruction of unsold clothing, requiring brands to donate or recycle surplus

stock. The country has built dedicated textile collection networks, boosted by government funding and joint initiatives with the private sector, jump-starting large-scale recycling and a thriving second-life clothing market. Eco-labels provide shoppers with clear insight into a product's environmental footprint at the time of purchase.

Bangladesh's Accord on Fire and Building Safety, a binding deal between brands and trade unions, has been a game-changer for worker safety. It establishes independent factory inspections, makes audit results public, and enforces strict timelines for problem-solving. Many see this approach as the gold standard for boosting social compliance and worker protection in complicated global supply chains.

China has taken a different approach, blending mandatory environmental reporting with investments in closed-loop manufacturing parks and incentives for waterless dyeing technology. Its "Green Supply Chain" project, run with major apparel exporters, calls for regular public updates on environmental performance and rewards companies that achieve tough pollution-reduction goals.

The ZDHC Roadmap to Zero has rallied 280 signatories to phase out 11 key chemical groups from textile production, a strong example of industry taking voluntary action on a global scale. Meanwhile, in the United States, transparency and supply chain accountability are front and centre, thanks to the Uyghur Forced Labour Prevention Act (2022), which bans imports made with forced labour and requires brands to prove the origins of their materials.

A comparative analysis of these international approaches demonstrates that effective progress in sustainable textiles is achieved through a combination of legislation and policies, active industry collaboration, and well-informed consumers. By integrating measures such as extended producer responsibility, digital product passports, mandatory transparency standards, and independent third-party social audits, India has the opportunity to develop a more comprehensive policy framework and advance rapidly toward a just and environmentally responsible textile sector.

9.2. India-Specific Roadmap

From 2025 to 2027, India plans to test Extended Producer Responsibility (EPR) frameworks for textiles to manage pre-consumer and post-consumer waste. Tamil Nadu and Gujarat serve as pilot textile hubs for this initiative. For these pilots to succeed, setting specific collection goals, offering financial incentives to recyclers, and using digital tracking to ensure traceability are crucial. Between 2028 and 2030, the roadmap calls for a national rule requiring major brands to use at least 50% recycled fibre in their products, backed by eco-labels that clearly show recycled content and environmental impact to shoppers. The plan also includes rolling out digital wage payments across the industry to boost labour transparency and facilitate real-time compliance tracking. Zero-liquid discharge (ZLD) standards should be expanded to every major textile hub, with government support for installing and upgrading effluent treatment plants.

Looking further ahead, after 2030, the roadmap envisions building net-zero textile clusters powered by renewable microgrids, where traditional artisans and modern factories work together, and a push for green industrial parks designed with shared facilities for waste management, water reuse and clean energy. To tie it all together, a permanent National Sustainable Textiles Council could coordinate policies, track progress, and help the industry adapt through research, training, and international partnerships.

Cross-cutting measures should include the following:

- Adoption of digital product passports for traceability and consumer information by 2030.
- Integration of environmental and social criteria into government procurement policies to stimulate demand for sustainable textiles
- Introduction of tax incentives for investments in circular business models, alternative fibres, and low-impact technologies;
- Strengthening social audit systems through independent third-party agencies and worker

participation (Grundmeier et al., 2026).

When considered as a whole, this phased and multi-dimensional roadmap—designed to reflect India's particular industry structure, institutional capacity in textiles, and social context—offers a practical path for overcoming the longstanding barriers faced in this sector. By adopting these measures, India is well positioned to address its historical challenges and assume a leading role in advancing sustainable fashion on the global stage.

10. Conclusion

Fast fashion, while dominating the global fashion scene, poses significant challenges to long-term sustainability due to its social costs and increasing environmental degradation. India's textile sector should aim toward regenerative resource management models that emphasise efficient material use while ensuring protection of workers' rights and dignity throughout the supply chain. Such a shift will only be achievable when a holistic approach is taken that balances technological advancements with legislation and policies while fostering social and cultural exchange among industry, workers, and consumers.

Consumer behaviour, especially among Gen Z, can play a crucial role in shaping sustainable industrial standards in the fast fashion era by consciously choosing products that emphasise ethical sourcing, transparent supply chains, durability, and the absence of labour violations. This can motivate the textile sector to adopt sustainable long-term practices. A culture of conscious consumption, especially when choosing textiles and garments, should be promoted through initiatives such as educational programs in schools, universities, and community settings. This will encourage consumers to value environmental sustainability, skilled craftsmanship, and quality, and prefer natural textiles and handlooms.

Moreover, social media platforms and influencers can play a meaningful role by shaping public perceptions of fast fashion and promoting sustainable fashion choices, thereby supporting brands and advancing circular textile practices. Through such practices, these actors can play a pivotal role in fostering a broader commitment to environmental stewardship. Within the textile and

fashion industry, enterprises should make financial and operational decisions, considering not only profit or loss but also the full range of environmental and social costs. By adopting business practices, pricing structures, and environmental and social cost considerations, the textile and clothing industries can make a meaningful impact on society and the environment through activities such as publishing annual sustainability reports, joining voluntary certification schemes, and adopting transparent supply chain reporting. For small players such as MSMEs, capacity-building initiatives can help them achieve sustainability goals.

If the textile and fashion industry shows willingness to fulfil its legal obligations, and more effective monitoring systems are developed by regulatory agencies through regular and thorough factory inspections, with proportionate penalties imposed on big and small industries and brands alike for non-compliance, policymakers establish material recycling systems, align fiscal incentives with circular economy principles, encourage and invest in research and development for alternative fibres, low-impact dyeing technologies, and biodegradable materials via research grants and public-private partnerships, and introduce robust green procurement criteria for public-sector textile purchases, it can become a pathway toward achieving sustainable goals in this sector. Moreover, the alliance of stakeholders in this sector—industry representatives, government representatives, NGOs—through collaborative initiatives and knowledge exchange, can support best practices to address systemic challenges to sustainability and fast fashion.

To achieve long-term sustainability in the textile sector vis-à-vis fast fashion, India is in a pivotal position to shape the future of sustainable textiles, balancing economic progress, environmental stewardship, and social inclusion. By reviving artisanal traditions and skilled craftsmanship, raising awareness of khadi and natural handlooms, investing in technological advancements such as digital prototyping and

biomaterials, strengthening collaboration among stakeholders, and building resilience to emerging global competitiveness, India can position itself as a global leader in sustainable fashion and textiles.

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References

- Arrigo, M. (2021). Fast fashion business model innovation: The case of Inditex–Zara. *Journal of Fashion Marketing and Management*, 24*(3), 317.
- Bäck, J., Aszalós, R., Ceulemans, R. J., Glatzel, G., Hanewinkel, M., Kakaras, E., & Altimir, N. (2017). Multi-functionality and sustainability in the European Union's forests. *EASAC Policy Report*, (32).
- Begum, Z., & Das, S. (2017). Global and Indian supply chain of textiles. In *A Study of India's Textile Exports and Environmental Regulations* (pp. 143-157). Springer Singapore.
- Central Pollution Control Board. (2023). Compliance status of effluent discharge in Panipat textile cluster. <https://cpcb.nic.in/>
- Central Pollution Control Board. (2024). Air quality assessment in Tiruppur textile cluster. <https://cpcb.nic.in/>
- DyeCoo. (2023). Waterless dyeing technologies. DyeCoo Textile Systems B.V.
- Ellen MacArthur Foundation. (2017). A new textiles economy: Redesigning fashion's future. <https://ellenmacarthurfoundation.org/a-new-textiles-economy>
- Goaied, E. (2025). Case study of fast fashion and sustainable white cotton T-shirts: A comparative life cycle assessment.

- Goyal, A., & Nayak, R. (2020). Sustainability in yarn manufacturing. In *Sustainable Technologies for Fashion and Textiles* (pp. 143-157). Woodhead Publishing.
- Grundmeier, A. M., Bräuning, M., Blaga, M., Kazlacheva, Z., Zlatev, Z., Bizjak, M., & Ertekin, M. (2026). Why textile education should embrace sustainability: Operationalising ESD through service learning on technical textiles. In *Proceedings of the 9th International Symposium "Technical Textiles - Present and Future"* Edition 2025 (p. 225).
- Habib, A., Ullah, A., Maha, M. M., & Bristy, A. (2025). Advancing sustainable fashion through 3D virtual design for reduced environmental impact. *Journal of Textile Engineering & Fashion Technology*, *11*(3), 143-157.
- Iyer, S. (2024). Air quality, health, and energy challenges in Tiruppur's textile industry. *Indian Journal of Environmental Studies*, *42*(1), 92.
- Kapoor, A. (2022). Textile waste generation and management in India: Scale, challenges, and policy responses. *Indian Journal of Waste Management and Urban Studies*, *11*(3), 145.
- Khurana, K., & Muthu, S. S. (2022). Are low-and middle-income countries profiting from fast fashion? *Journal of Fashion Marketing and Management: An International Journal*, *26*(2), 143-157.
- Lanza, A. (2024). Styling a sustainable future: Investigating threats and responsible practices in the fashion industry [Master's thesis].
- Limon, G. Q. (2023). Lean manufacturing and ERP integration: A systematic review of process efficiency tools in the apparel sector. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.5268414>
- M.C Mehta v Union of India, (1992) Supp (2) SCC 633 (SC).
- Ministry of Labour and Employment, Government of India. (2020). The Code on Wages, 2019: An overview. https://labour.gov.in/sites/default/files/Code_on_Wages_Booklet.pdf
- Ministry of Labour and Employment, Government of India. (2021a). The Industrial Relations Code, 2020: Key features and implementation. https://labour.gov.in/sites/default/files/IR_Code_Key_Features.pdf
- Ministry of Labour and Employment, Government of India. (2021b). The Code on Social Security, 2020: An overview. https://labour.gov.in/sites/default/files/SS_Code_Key_Features.pdf
- Ministry of Labour and Employment, Government of India. (2021c). The Occupational Safety, Health and Working Conditions Code, 2020: An overview. https://labour.gov.in/sites/default/files/OSH_Code_Key_Features.pdf
- Mishra, O. (2024). Twirl Store: Pioneering sustainable textile practices by closing the loop. *Emerald Emerging Markets Case Studies*, 143-157.
- Niinimäki, K., Peters, G., Dahlbo, H., & others. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, *1*(4), 143-157.
- Noosuwan, C., Autadee, Y., Saengsupavanich, C., & Açık, A. (2024). Measuring economic convergence: Evidence from container throughputs of ASEAN-5 countries. *World Review of Intermodal Transportation Research*, *12*(1), 143-157.
- Patel, M., Sahu, A., & Rajak, R. (2022). Solid waste management in textile industry. In *Handbook of Solid Waste Management: Sustainability through Circular Economy* (pp. 143-157). Springer Nature Singapore.
- Patel, S. (2023). Fast fashion and the fragmentation of India's textile supply chain. *Journal of Sustainable Fashion and Supply Chain Management*, *12*(4), 301.
- People for the Ethical Treatment of Animals (PETA) India v Union of India & Ors, (2020) SCC OnLine SC 686.
- Policy, P., Yap, N. T., Awasthi, S. K., & No, P. WASTE MANAGEMENT FOR SUSTAINABLE DEVELOPMENT IN INDIA.
- Radhakanta Nayak v. State of Odisha, (1992) 2 OLR 543.
- Raghavan, P. (2024). Environmental and health impacts of textile production in Tiruppur, India: The case for sustainable energy transition. *Journal of Environmental Health and Industrial Policy*, *36*(2), 178.
- Rao, M., & Srivastava, K. (2023). Legal frameworks for environmental sustainability in India's textile industry: An analysis of key legislation and policy. *Indian Journal of Environmental Law*, *22*(1), 45.

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- Rápó, E., & Tonk, S. (2021). Factors affecting synthetic dye adsorption; desorption studies: A review of results from the last five years (2017–2021). *Molecules*, *26*(17), 5419.
- Singh, R. (2023). China's dominance in India's textile imports: Implications for domestic MSMEs. *Journal of International Trade and Development*, *18*(2), 145.
- Siregar, Y., Kent, A., Peirson-Smith, A., & Guan, C. (2023). Disrupting the fashion retail journey: Social media and GenZ's fashion consumption. *International Journal of Retail & Distribution Management*, *51*(7), 143-157.
- Stanescu, M. D. (2021). State of the art of post-consumer textile waste upcycling to reach the zero waste milestone. *Environmental Science and Pollution Research*, *28*(12), 1143-1570.
- Stenton, M., Kapsali, V., Blackburn, R. S., & Houghton, J. A. (2021). From clothing rations to fast fashion: Utilising regenerated protein fibres to alleviate pressures on mass production. *Energies*, *14*(18), 5654.
- Textile Exchange. (2023). Preferred fibre and materials market report. https://textileexchange.org/app/uploads/2022/10/Textile-Exchange_PFMR_2022.pdf
- Textile Outlook International. (2022). India's textile industry under pressure: The impact of fast fashion on cotton and traditional crafts. *Textile Outlook International*, *215*, 14.
- Tiruppur People's Forum. (2024). Community health and textile industry emissions: Tiruppur case study.
- United Nations Environment Programme. (2019). Putting the brakes on fast fashion. <https://www.unep.org/news-and-stories/story/putting-brakes-fast-fashion>
- Vellore Citizens' Welfare Forum v Union of India, (1996) 5 SCC 647 (SC).