

**Sustainable Textiles in India: A Systematic Literature Review**

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**Abstract**

The textile and fashion industry has a significant global presence in the manufacturing, distribution, sale, and consumption of its products, resulting in a substantial environmental impact. Environmental concerns are assuming a progressively significant role. The examination of sustainability in this particular situation is thus quite significant. The training material titled "Sustainable textiles" is a comprehensive collection of scientific, technical, economic, and environmental information from many publications and studies. It covers numerous aspects of the sustainable development of textiles. The study aimed to conduct comprehensive systematic literature analysis of sustainable textiles in India. In order to perform the study, an initial search was conducted using the keywords "Sustainable," "Textile," and "India." The selected database was Scopus, which was chosen based on its extent and capability to export bibliometric data from documents to scientific mapping software, specifically VosViewer (a mapping analysis tool). The selection criteria for documents on the aforementioned platforms were publications in English from 2010 to 2024 in which, total of 195 articles were identified in the investigation. The findings concluded that it is imperative to conduct additional research on the practical application of sustainable textile methods and their effects on many stakeholders, including as workers, consumers, and the environment. By further developing this research, researchers can facilitate significant transformation towards a more environmentally friendly and adaptable textile sector in India and other regions.

### 1. Introduction

The textile industry is being significantly impacted by environmental concerns, which are becoming more prominent due to government regulations and customer demands (Kumar & Suganya, 2017). The trend towards sustainability has been observed in almost every part of the world and across all industries (Xu, et. al., 2018). It is important to be aware that the textile industry is a major contributor to pollution (Venkatraman, et. al., 2021). The increasing popularity of sustainable textiles can be attributed to various factors, including the ethical awareness that many individuals possess. Several design and fashion companies are transitioning away from their unsustainable practices as well (Pandit, et. al., 2019).

Sustainability is a comprehensive notion that encompasses the long-term viability of economic, social, institutional, and environmental components of human society (Moore, et. al., 2017). The purpose of this concept is to establish a framework for organizing human society and activities in a way that allows society, its individuals, and its economies to fulfill their requirements and achieve their highest capabilities in the present, while also safeguarding the diversity of life and natural ecosystems. Additionally, it involves planning and taking action to ensure the long-term sustainability of these ideals (Ógmundarson, et. al., 2020). The textile industry is a prolonged and complex industrial chain within the manufacturing sector (Madhav, et. al., 2018). The collaboration encompasses participants from several sectors, including agriculture, chemical fibers, dye and chemical manufacture, textile and garment industry, retail, service industry, and waste management (Adane, et. al., 2021).

Ecological concerns have gained increasing significance in recent years, particularly in the textile and clothing industry, which is not typically recognized for its environmentally friendly practices (Desore & Narula, 2018). The textile merchandise emits noxious compounds that pose a threat to the environment (Tony, 2021). The conventional textile business exerts significant pressure on natural resources and causes environmental pollution due to its reliance on chemical-intensive processes. Consequently, there is a pressing demand for eco-friendly textiles (Lara, et. al., 2022). Ensuring pollution control is equally crucial to eliminating hazardous effects throughout the production stages of a product (Liu, et.al., 2022). The introduction of rayon for garments has caused devastating damage to the forests Recent research now highlights the possibility of using cotton, hemp, and bamboo as natural fibers that may be advantageous in developing sustainable fashion (Islam et al.2025). and has also allowed the development of the natural sustainable fibers of organic cotton, hemp, and bamboo fibers (Shahi, et. al., 2021).

Sustainable textiles refer to materials and processes that are both safe and beneficial for both humans and the environment. This includes all stages of the product's life cycle, and all energy, materials, and processes used are derived from renewable or recycled sources (Chourasiya, et.al., 2024). Additionally, it can indicate that materials have the ability to safely return to either natural or industrial systems, and all phases of the product life cycle could also contribute to improving societal well-being (Nimkar, 2018). Sustainable textiles refer to methods of attaining more environmentally-friendly materials and technologies, while also enhancing recycling practices within the sector. Sustainability in textiles entails the utilization of resources in a manner that avoids their depletion (Khattab, et. al., 2020).

Eco-Design involves more than simply disregarding the fundamental principles of design in order to prioritize environmental advantages (Acharya, et. al., 2021). Optimal environmental results can be attained through strategic design decisions, prioritizing performance and outcomes while maintaining the integrity of form and function (Sachidhanandham & Periyasamy, 2021). Textiles and fashion eco-design encompasses more than just using eco-friendly materials. It involves creating choices that minimize the overall environmental effects and enhance the efficiency of the product over its whole lifespan (Shafqat & Saccavini, 2023). This also raises the concern of "sustainable consumption," which involves using textile materials in a way that minimizes consumption and enhances their sustainability (Chamorro-Mera & Robina-Ramírez, 2023).

A systematic literature review on sustainable textiles in India is imperative to understand the current research landscape and address key challenges in the textile industry (Fonseca, et. al., 2024). By analyzing articles from the Scopus Database, the study aims to identify trends, gaps, and opportunities in sustainable textile research. The bibliometric analysis, including the co-occurrence of keywords, provides insights into the interconnectedness of concepts and emerging themes. Moreover, examining the number of documents published each year allows for tracking the evolution of research over time. Inclusion and exclusion criteria ensure the selection of relevant and high-quality literature. Utilizing VosViewer as a mapping tool enables visualization of research networks, facilitating the identification of central themes and key research clusters. Such a comprehensive review serves as a foundational step towards fostering sustainable practices within India's textile industry, ultimately contributing to global environmental preservation efforts.

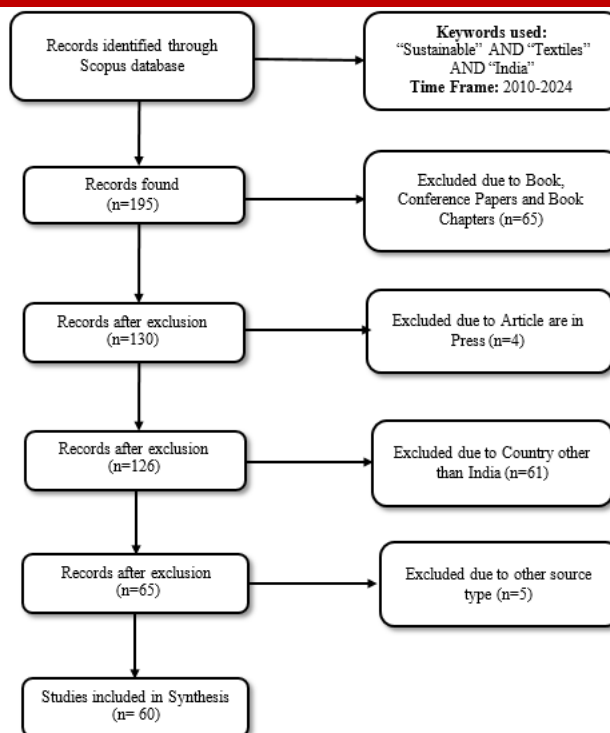
### 2. Research Methods and Methodology

In order to perform the study, an initial search was conducted using the keywords "Sustainable," "Textile," and "India." The selected databases were Scopus, which was chosen based on its extent and capability to export bibliometric data from documents to scientific mapping software, specifically VosViewer (a mapping analysis tool). The program was selected for mapping purposes because to its ability to classify and analyze documents using both qualitative and quantitative methods, by processing their bibliometric data.

The selection criteria for documents on the aforementioned platforms were publications in English from 2010 to 2024 that had the terms "Sustainable," "Textile," and "India" in their structure. A total of 195 articles were identified in the investigation, and their bibliometric data was imported into VosViewer.

### 3. Bibliometric Analysis

The reviews adhere to the PRISMA Statement, which is a set of guidelines called "Preferred Reporting Items for Systematic Reviews and Meta-Analyses". PRISMA showcases the quality of the review and allows readers to comprehend its strengths and weaknesses, as well as replicate the review approaches



**Figure 1: PRISMA model for Bibliometric analysis**

Figure 1 illustrates the detailed and organized procedure for extracting data. The procedure entails retrieving research articles, doing source analysis, removing extraneous information based on predetermined criteria, and ultimately assessing the content of the source research papers. A defined temporal span of 15 years (2010-2024) has been allocated for performing an exhaustive systematic literature evaluation to acquire targeted papers within the subject field. Initially, a grand total of 195 publications were discovered on Scopus inside the designated study timeframe. Out of the 195 papers, 65 were excluded because they were published as books, conference presentations, or book chapters. Consequently, the total number of documents that can be obtained without any limitations is 130. In addition, the remaining papers were subjected to a filter publishing stage screening to ascertain if the recovered research papers are in their final form or still in the process of being published. The total number of articles in press that were excluded from the criterion was (n=4). Consequently, the total number of papers left would be (n=126). The papers that were obtained underwent a screening process to determine if they contained research linked to India (n=65) or studies unrelated to India (n=61). The study exclusively concentrated on literary works composed in the English language. Source analysis was conducted exclusively on articles published in academic journals, while articles published in trade journals and conference proceedings were excluded (n=5). As a consequence, a total of 60 publications remained following the final filtering procedure.

**Table 1: Inclusion and Exclusion Criteria**

Criterion	Inclusion	Exclusion
Keywords	Records conferring the relationship between Sustainable, Textile, and India.	Records excluded in which variables have no relation.
Type of Literature	Journals, Review Articles	Book chapters, conference Papers, and Editorials.
Language	English	Other than English
Timeframe	Concerning 2010-2024	<2010
Paper Stage	Final stage	Excluded that are on running stage
Country	India	Countries other than India

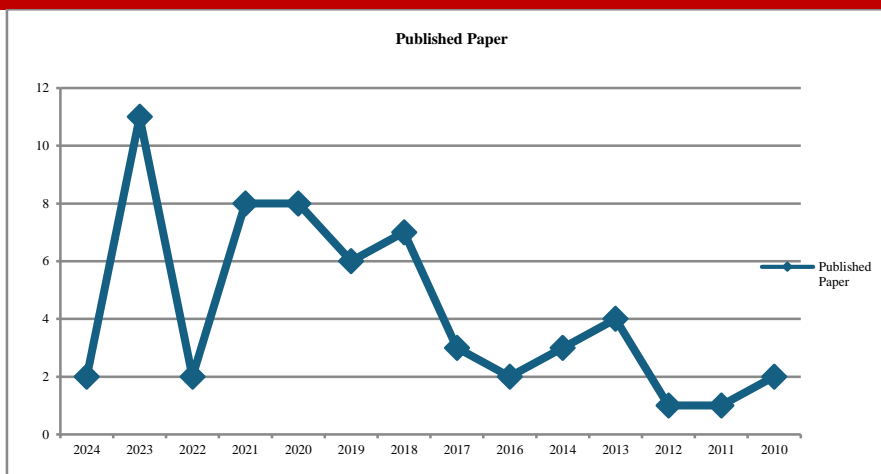
Table 1 provides a clear overview of the criteria used for selecting articles for the study on Sustainable Textiles in India, including both the inclusion and exclusion criteria. The inclusion criteria under the "Criterion" column require that records establish a correlation between Sustainable, textiles, and India. This ensures that only papers that are directly pertinent to the study topic are incorporated. Conversely, the exclusion criteria specify that records are eliminated if the variables are unrelated to the issue. This aids in the exclusion of irrelevant papers that may not contribute to the analysis. The literature type considered for inclusion consists of journals and review articles, which are known for their high level of rigor and specialization in specific subjects. Book chapters, conference articles, and editorials are omitted due to their potential lack of sufficient depth or relevance for the study. Language-wise, only papers written in English are included, as this is the language of the researchers conducting the study. Papers in languages other than English are excluded due to potential language barriers. The timeframe for inclusion spans from 2010 to 2024, ensuring that the study covers recent research while still capturing a significant amount of relevant literature. Papers published before 2000 are excluded as they may not reflect current trends or advancements in the field. Lastly, articles in the final stage are included, while those in press stage are excluded. This ensures that only completed and peer-reviewed research is considered for the analysis.

➤ **Time Frame**

**Table 2: No. of documents published in the given time frame**

Year	Published Paper
2025	4
2024	2
2023	11
2022	2
2021	8
2020	8
2019	6
2018	7
2017	3
2016	2
2014	3
2013	4
2012	1
2011	1
2010	2

The table 2 represents the number of published papers each year from 2010 to 2024 focusing on sustainable textiles in India.



**Figure 2: Number of total publications on Sustainable, textiles and India, indexed in Scopus from 2010 to 2024**

The figure 2 shows the number of total publications on Sustainable, textiles and India, indexed in Scopus from 2010 to 2024.

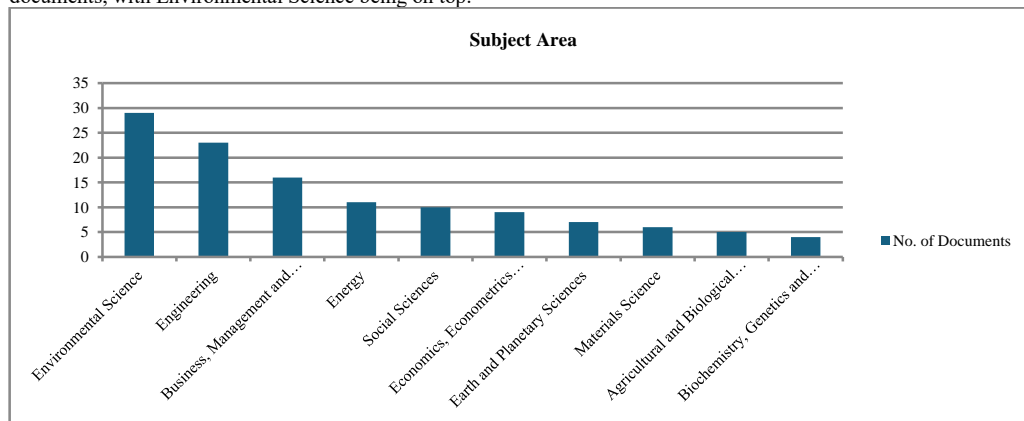
In 2010, two publications were published, demonstrating an emerging interest in the subject. From 2011 to 2013, there was a consistently low number of publications, with just one or two papers being published each year. This indicates a lack of focus or research in this particular field. Nevertheless, in 2014, there was a marginal rise to 3 papers, indicating an increasing recognition of sustainability concerns in the textile business. The trend exhibited volatility, with a mere 2 papers in 2016 and 3 papers in 2017. Starting in 2018, there was a steady and continuous increase. In the year 2018, a total of 7 publications were published, which suggests a revived emphasis on the subject matter. The number of papers steadily increased in the following years, with 6 papers in 2019, and 8 papers each in 2020 and 2021, indicating a consistent interest and perhaps growing research activity in this field. In 2023, there was a notable increase in research and focus on sustainable textiles in India, as evidenced by the publication of 11 papers. The surge in this peak can be ascribed to multiple sources, including heightened consciousness of environmental concerns, regulatory actions, and augmented funding for sustainable development research. Overall, the data demonstrates a changing and developing research environment focused on sustainable textiles in India, with a growing emphasis and actions in recent years.

➤ **Subject Area**

**Table 3: No. of articles published in a particular subject area**

Subject Area	No. of Articles
Environmental Science	29
Engineering	23
Business, Management and Accounting	16
Energy	11
Social Sciences	10
Economics, Econometrics and Finance	9
Earth and Planetary Sciences	7
Materials Science	6
Agricultural and Biological Sciences	5
Biochemistry, Genetics and Molecular Biology	4

Table 3 represents the total no. of articles published in a particular subject area. The table consists of top ten subjects areas only with their correspondings no. of documents, with Environmental Science being on top.



**Figure 3: Graphical Representation of articles published in a particular subject area**

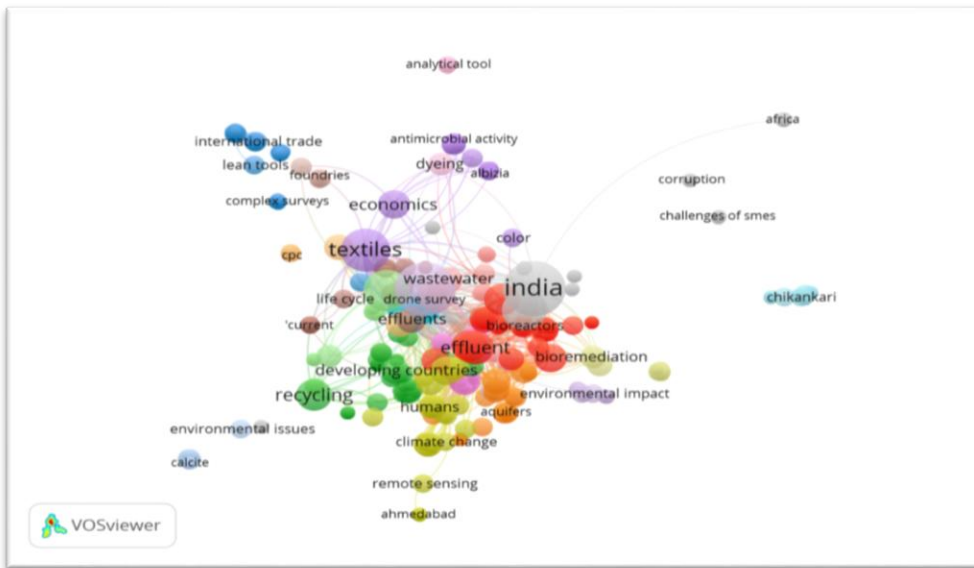
Figure 3 represents the research on sustainable textiles in India spans across various subject areas, with a predominant focus on environmental science, as evidenced by 29 documents. Engineering follows closely with 23 documents, emphasizing the technological aspect of sustainable textile production. Business, management, and accounting contribute 16 documents, highlighting the economic and managerial implications of adopting sustainable practices in the textile industry. Energy-related aspects are also significant, with 11 documents addressing the energy requirements and efficiencies of sustainable textile production. Social sciences and economics, econometrics, and finance contribute 10 and 9 documents, respectively, reflecting the social and economic dimensions of sustainable textile adoption. Additionally, there are contributions from earth and planetary sciences, materials science, agricultural and biological sciences, and biochemistry, genetics, and molecular biology, each offering insights into specific aspects of sustainable textile production in India.

➤ **Co-Occurrence of Keywords**

**Table 4: Co-occurrence of Keywords related to sustainable textiles in India**

S.no.	Keywords	Co-occurrence	S.no.	Keywords	Co-occurrence
1	India	20	11	Article	5
2	Textile Industry	21	12	Industrial Waste	5
3	Textiles	12	13	Human	4
4	Sustainable Development	11	14	Effluents	4
5	Sustainability	12	15	Water Pollutant	3
6	Effluent	7	16	Water Pollutants, Chemical	3
7	Water Waste Treatment	7	17	Water Disposal	3
8	Sewage	6	18	Environmental Monitoring	3
9	Dye	6	19	Humans	3
10	Recycle	6	20	Procedures	3

Co-occurrence refers to the frequency and closeness of keywords on a given subject, as well as the relationship between them. Table 4 shows the co-occurrence of keywords related to sustainable textiles in India.



**Figure 4: Co-occurrence of Keywords related to sustainable textiles in India (Cluster Diagram)**

The co-occurrence data reveals the key focus areas within sustainable textiles in India. "India" (n=20) and "Textile Industry" (n=19) are the most frequent keywords, emphasizing the context and industry. "Sustainable Development" (n=11) and "Sustainability" (n=10) signify the overarching goals. Concerns like "Effluent" (n=7) and "Industrial Waste" (n=5) underscore environmental challenges. "Water Waste Treatment" (n=7) and "Recycle" (n=6) suggest efforts towards sustainability. Notably, "Human" (n=4) and "Humans" (n=3) imply the human impact aspect. "Dye" (n=6) indicates attention to chemical usage, while "Water Pollutant" (n=3) and "Water Disposal" (n=3) highlight water pollution issues. Overall, the data underscores the multidimensional approach to sustainable textile practices, emphasizing environmental, social, and industrial aspects.

#### 4. Literature Analysis

According to the analysis, textiles in India demonstrate a commitment to sustainability in multiple areas, including as water and industrial waste management, economics, entrepreneurship, and eco design. The extracted literature is categorized into sub-sections based on themes, which groups comparable facts together. The collected material is scrutinized and evaluated according to the predetermined themes in order to offer a thorough analysis and pertinent suggestions for future research on the correlation between sustainable textiles in India.

##### a. Sustainable Textiles in India concerning water and industrial waste management

The textile industry is notorious for its environmentally detrimental procedures, as it generates colorful wastewaters that extensively contaminate the environment. The results indicated that the utilization of natural coagulants is a more environmentally friendly and sustainable approach in comparison to chemical coagulants, which are biodegradable (Mohan, et. al., 2019); (Pattnaik & Dangayach, 2021). The utilization of peanut hulls for water color removal serves a dual purpose of wastewater treatment and sustainable management of solid waste (Panchal, et. al., 2020); (Ramamoorthy, et.al., 2019); (Srinivas & Singh, 2018); (Singh & Srivastava, 2023). The color intensity of the dyed yarn utilizing cationic surfactant was determined to be superior and more than that of the anionic surfactant. Other researchers found that the intensity of the color increased as the yarns absorbed more dye (Baliarsingh et. al. 2013).

Groundwater serves as the primary drinking water supply for millions of rural and urban families in India. Groundwater is typically more resistant to contamination and pollution than surface water bodies (Arivukkurasu, 2014); (Mangotra & Singh, 2024). The prevention of groundwater contamination caused by effluents from textile companies and the implementation of remedial techniques are crucial for achieving sustainable development (Prabha, et. al., 2013). The occurrence of droughts in India has notable sociological, economic, and environmental impacts (Nandi & Biswas, 2024).

The system's environmental performance was enhanced by the increase in effluent reuse (Nakhate, et. al. 2020); (Koundal, et. al. 2023). Furthermore, researchers are actively seeking alternate approaches to mitigate textile waste. The primary obstacle to the waste recycling program was the lack of proper separation of waste in rural areas. Therefore, it is crucial for the future solid waste management program to separate biodegradable garbage, dry waste (such as paper, plastic, and metal), and other components at the source (Rajpal et al., 2020). Effluent treatment plants serve as the final barrier to prevent the release of contaminants from industrial effluents (Mohan, et. al., 2021); (Karthik, et. al., 2010). According to one researcher, the biphasic "upflow anaerobic sludge blanket (UASB)" reactor has been proposed as a viable, cost-effective, environmentally friendly, and sustainable treatment solution for textile dyeing wastewater when combined with sago effluent as a co-substrate (Senthilkumar, et. al., 2011). The treatment experiments showed that 76.2% of the organic fraction, 73.3% of phosphate, and 81.6% of nitrate were removed. The design of a closed-loop decentralized effluent treatment system was based on laboratory-scale investigations, with the goal of achieving zero-liquid discharge (ZLD) (Kopperi. et. al., 2023), (Srivastava & Bandhu, 2022).

Various management strategies, such as treating surface water supply, reducing the operation time of tubewells, developing rooftop rainwater harvesting systems, and implementing artificial recharge systems, in different potential zones of the Gandhinagar region was also recommended (Siddha and Sahu 2018). These strategies aim to ensure the sustainable development of groundwater. A group of researchers conducted an experiment to create a waste water treatment facility that combines Solar Energy with a biomass combustor to vaporize waste water. The use of a Wind Energy assisted vibrator to enhance water evaporation by creating turbulence (Nilofar Nisha, et. al., 2020).

##### b. Sustainable Textiles in India concerning Economics

To reap the benefits of Lean and invest in sustainable Industry 4.0 techniques that lead to Advanced Digital Production (ADP) techniques, the entire MSME sector must rapidly scale up their "Lean manufacturing technique practices" (Sharma & Singh, 2023); (Bhattacharya & Ramachandran, 2021). To help city planners accommodate the textile sector while still allowing for sustainable growth, researchers developed a ready-reckoner that estimates freight trips based on square footage and personnel (Dhonde & Patel, 2021). The fact that individual weavers make 50% more money than cooperative weavers in the short term but lose money in the long run shows that the market for their products needs to be organized and enlarged if the handloom industry is to remain viable (Mishra & Bhattacharjee, 2017). In the case of a weak domestic currency, the results indicated that a high price-cost margin and financial flexibility mitigate the negative effects of exchange rate depreciation, protecting long-term investments and encouraging them to remain in the Indian manufacturing sector (Panda & Nanda, 2019). Also, keep an eye out for developments in the field of textile recycling. The textile industry is subject to a number of taxes, including excise duty and the goods and services tax (GST) (Perwej & Jagetia, 2020).

Discussions in India about populism, economic growth, and neoliberal policies suggest that efforts to introduce ethical standards in final markets will have to deal with the confluence of corruption, poor leadership, and financial resources (Dash, 2019). There are several measures that could greatly contribute to the long-term growth of the T&C industry. These include shifting the emphasis from capital inflows to outflows, participating in WTO Trade Facilitation Agreements, applying the "deemed export" duty drawback to priority manufacturing industries, and wisely utilizing infant industry protection (Jaswal & Garg, 2017).

Changes in land use and increased energy use are two key components of urbanization that greatly exacerbate climate change. According to spatial measures, the central business district has developed into a densely populated urban class, whereas the city's outskirts are more like a collection of smaller cities (Ramachandra, et. al., 2014). According to the results, energy-intensive industries do not make up the majority of India's exports (Shahid & Ahmed, 2016). Sustainable development also necessitates that the TC improve the interdependencies among infrastructure, technology, procurement, production, and marketing in order to cut costs, boost efficiency, and compete on a global scale (Bhaskaran, 2013).

There is a selective effort in the field of SSCM usage with the progression of "Sustainable Supply Chain Management Enablers" (SSCMEs), the categorization into enabler and ward classifications, and the fluffy "Matriced' Impacts Cruise's Multiplication Applique ea' un Classement" (MICMAC) (Patel, et. al., 2021). From a sustainability standpoint, as well as a business standpoint, connecting circular economy concepts with supply chain processes is beneficial. Circular economy approaches in the textile industry can help achieve long-run sustainability (De Felice et al.2025), according to multiple authors. Conversely, as fewer people use roads in the city, fewer vehicles will also be on the road which will lead to less environmental impact due to reduced emissions stemming from improved traffic flow (Dhonde & Patel, 2020).

#### c. Sustainable Textiles in India concerning Entrepreneurship and Eco- designs

Most Indian women predominantly choose to work in sectors such as agriculture, agro-based industries, handicrafts, handlooms, cottage industries, textile and apparel, leather, marine products, and tobacco products (Nivedha & Sutha, 2019). The results indicated that women's ability to bounce back from challenges and take charge is crucial for coordinating sustained collective efforts to ensure the survival of the artisanal community during times of crisis (Basu, 2023). In order to enhance comprehension of entrepreneurship, several scholars have put forth ideas pertaining to social entrepreneurship and have analyzed Taparia's entrepreneurial traits, motives, and effectiveness, and how these factors contributed to the growth of his organization (Vikas & Mathur, 2023).

Similarly, a parallel case study elucidated the intricacies of the market and concludes with Rahul Rastogi contemplating strategies to enter and develop a start-up in the present circumstances (Wason & Wason, 2016). The findings demonstrated that Rangotri embraced sustainability practices and joined the SWITCH-Asia Sustainable Textiles via Sustainable Development (SUSTEX) initiative, which focuses on transforming crises into opportunities. Moreover, the values of the owner, sustainable entrepreneurship, and willingness to pursue sustainable options Recent research is also investigating how SMEs conceptualize sustainable decision-making with challenges they face in the textile sector in terms of both methods and practices (Naranjo et al. 2025). are viewed as important factors to drive environmental sustainability (Yadav & Rani, 2024); (Pappu, et. al., 2020). Sustainable supply chain management (SSCM) is a strategic approach In this regard, adopting circular economy attributes throughout textile manufacturing supply chains is regarded as an important enabler to achieve the triple bottom line of sustainability (Akash et al.2025), which encourages the adoption of green practices around traditional supply chain (SC). Indian businesses are under considerable pressure to adopt sustainable supply chain practices (SSCPs) in their traditional supply chain (Panigrahi & Rao, 2018); (Jain, et. al., 2023).

#### d. Sustainable Textiles in India concerning others

The extent of urban expansion and the scale of the textile sector in the city are assessed using historic maps, Google imagery, and foundation inspections (Dhonde & Patel, 2021). The embroidered fabric of India possess a rich heritage that exudes a captivating aesthetic charm and conveys profound symbolism. The researcher, together with other craft revivalists, non-government organizations, and designers, aims to support the resuscitation of historical processes and the preservation of skills. This is done with the goal of creating a model of self-innovation as well as excellence within rural communities (Kalra, 2014).

The escalating presence of accumulating rubbish heaps in our surroundings, along with the scarcity of resources such as water, excessive energy consumption, use of chemicals, carbon footprints, pollution, and other related factors, has generated a substantial need for environmentally friendly and sustainable alternatives in the textile and clothing industry. The "change" brought about by the "Industrial Revolution" had a substantial impact on the expansion of the fashion business (Dabhade-Samant & Sharma, 2020). Textile makers who are developing sustainable materials should consider the specific criteria that consumers prioritize when selecting organic clothing. Both domestic and international organic apparel makers can benefit from understanding the behavioral aspects that impact consumers' intention to purchase organic apparel. This understanding can help them discover potential customers (Sandhya & Mahapatra, 2018); (Goel & Goel, 2010).

The textile reactive dyeing industry is currently in need of salt-free reactive dyeing in order to address the challenges associated with salt usage (Arivithamani & Dev, 2017). Similarly, according to other researchers, the colored silk exhibited outstanding antibacterial action (reduction rate: ~38-55%) against the fungus strain *Aspergillus niger* (Baliarsingh, et. al., 2012).

Co-processing of effluents from the textile dyeing industry at an Effluent Treatment Plant is also important. The utilization of ETP sludge in the cement industry is a sustainable development approach that involves repurposing waste from one business as a valuable resource for another industry (Rajamanickam & Nagan, 2014); (Kumar & Adholeya, 2018), (Ashok Kumar, et. al., 2019). Textile reinforced concrete (TRC) has proven to be an effective alternative for retrofitting and reinforcing existing infrastructures, leading to its growing use as a load-bearing structural component. TRC (Textile Reinforced Concrete) constructions have a significantly reduced carbon footprint compared to traditional RCC (Reinforced Concrete) structures. This makes TRC a more sustainable option (Immanuel & Baskar, 2023).

The textile sector has become a significant contributor to pollution due to factors such as rising pollution levels, climate change, and growing apprehension about energy use in traditional garment production methods (Kumar & Mohan, 2021); (Basumatary, et. al., 2023). Removing or decreasing obstacles to the expansion of the Textiles & Apparel industry contributes to achieving equilibrium among the three aspects of sustainability: economic, environmental, and social (Gardas, et.al., 2018). Recycling old cloth not only extends the lifespan of the product but also generates employment opportunities for a significant number of individuals (Singh & Rani, 2021). India has the potential to replace China as a supplier for the USA in the industries of textiles, wearing apparel, leather, and associated items, as well as chemicals and non-metallic mineral products (Dhonde & Patel, 2020). This study adds to the existing body of literature on sustainability management by taking a practical approach to assess the influence of shop-floor-level activities on sustainability. The addition of this work to the literature on energy management is that it broadens the range of energy optimization efforts to achieve comprehensive sustainability advantages (Prashar, 2019). The study demonstrated that process sectors have a significant requirement for low to medium temperature heat, such as hot air, steam, hot water, and hot oil, which are typically derived from conventional sources (Bargale & Chougule, 2023).

### 5. Conclusion

To summarize, the comprehensive literature analysis of sustainable textiles in India has provided insights into significant patterns, deficiencies, and prospects within the textile sector. This study has conducted an examination of 195 articles from the Scopus Database and has found interconnected concepts and emerging themes. These include water and industrial waste management, economics, entrepreneurship, and eco-design. The review has offered a thorough comprehension of the present research scenario, acting as a fundamental measure to promote sustainable practices in India's textile industry and contribute to worldwide environmental conservation endeavors. Nevertheless, it is important to acknowledge certain limitations, including the emphasis on English-language media and the omission of non-English sources that could potentially offer valuable insights. Future study should strive to overcome these constraints by integrating a wider array of literature and investigating supplementary aspects of sustainability in textiles. Furthermore, it is imperative to conduct additional research on the practical application of sustainable textile methods and their effects on many stakeholders, including as workers, consumers, and the environment. By further developing this research, researchers can facilitate significant transformation towards a more environmentally friendly and adaptable textile sector in India and other regions.

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