

SDGs and Textiles

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Textile Industry and the SDGs

Exploring Synergies for a Better Future

 Springer

SDGs and Textiles

Series Editor

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The book series “SDGs and Textiles” addresses the strategies to achieve sustainable development goals (SDGs) in the present, past, and future. It presents books about the present and future policies of textile ministries of different countries, and books related to sustainability education around different parts of the world in the textile sector. Moreover, it would welcome the conference proceeding related to SDGs and Textiles. The series would cover books comparing the sustainability and SDGs of different institutions and countries. The individual book volumes in the series are thematic. The goal of each book is to give readers a comprehensive overview of a different area of sustainability in the textile sector. As a collection, the series provides valuable resources to a broad audience in academia, the research community, industry, and anyone looking to expand their knowledge of SDGs and Textiles.

Textiles and life are together – life cannot be separated from textiles as it is the most important need for human beings after food. In 2015, the United Nations General Assembly proposed 17 interlinked global goals to be achieved by 2030. Since then, academia and industry have paid much attention to achieving these goals. Textile found its close relation with almost all of these 17 goals.

SDG 1 - No Poverty: Poverty would never be overcome by a charity only; it is essential to develop people’s skills to have a better and wealthy life. Thus, the textile can be considered an excellent discipline to achieve this goal by creating jobs and small and medium businesses.

SDG 2 - Zero Hunger: Through the effective utilization of advanced application of Agrotech Textiles, it is possible to have higher crop yields and save crops from rough weather, unexpected rains, floods, insects, etc.; thus, geotextiles play an essential role in achieving this goal of sustainable development.

SDG 3 - Good Health & well-being: There has been much health consciousness after Covid19, and medical textiles assist in getting good health and well-being.

SDG 4 - Learning & Education: Textile or fashion has remained a significant discipline for societies for ages, and there has always remained much to explore in this field. Textile-related universities may play a vital role by offering free access to their education resources, training and spreading information among the locals.

SDG 5 - Gender Equality: The textile sector is one of the industrial sectors that accepted gender equality long ago; in particular, the garment sector has more females than males. Thus, the textile sector has been doing gender equality. Moreover, there has been a recent trend for Gender Neutral Clothing, which needs further study and may further assist gender equality.

SDG 6 - Clean Water & Sanitation: Textiles could be achieved through filtration, and of course, textile is one of the critical materials for filtration.

SDG 7 - Affordable & Clean Energy: With the recent advancement in material science and engineering, the textile sector has come on the front, not only by using this clean energy during textile production but also by assisting the production of this clean energy, either in the form of wind turbine blades made of textile composites or by energy harvesting from T-Shirts, etc.

SDG 8 - Decent Work: Recently, there has been much attention that the textile workers are not paid well, labor rights are not cared about, etc.

SDG 9 - Industry and innovation: Textile Industry always follows innovation; the textile companies that do not chase innovation cannot survive in the market.

SDG 10 - Reduced Inequalities: Getting better life and well-being would help reduce inequalities in the textile industry.

SDG 11 - Sustainable Cities: Sustainable Textile Cities through Buildtech and transport textiles.

SDG 12 - Consumption and Production: Textile and garment consumption and production all come under.

SDG 13 - Climate Action: Oekotex or Ecotech Textile, waste management of textiles are upfront to achieve this goal of sustainable development.

SDG 14 - Life Below Water: Mitigating microfiber waste in rivers and oceans may come under the context of it. There has been much attention on this subject after passing the bill at the parliament level of the UK.

SDG 15 - Life on Land: Geotech or Geotextiles studies life on land.

SDG 16 - Peace, Justice, and Strong Institutions: Protective textiles are doing their best to achieve peace, justice, and strong institutions.

SDG 17 - Partnerships for the Goals: The application of textiles to achieve sustainable development goals is only an example. In all textiles sectors, combined efforts of all the goals are essential to achieve true sustainability.

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Preface

The vast impact of the textile industry in modern society is undeniable. Around 70 million jobs, out of which two-thirds are based in Asia, is the size of its workforce. This is about 1% of the entire global human population. Now, regardless of our livelihood, today everyone needs to wear clothes and shoes. In short, the textile industry affects us all. This is why *Sustainable Threads: Collaborative Consumption, Technology, and Green Innovation in Textile* is a book that should be of general interest: the textile industry connects us all. Another common dimension that binds humanity together is our pressing need to lead increasingly sustainable processes that permit us to exploit our current productive activities and explore new pathways to innovate while ensuring that future generations will be able to do likewise.

The general aim of this book is to showcase current efforts in sustainability in the textile industry globally and in Spain. Chapter 1 gives an account of the existing research literature on the challenges of sustainability in the fashion industry, offers a review of trends, and identifies gaps for future research. Chapter 2 delves deeper into recent publications on public policy aligned with the Sustainable Development Goals in the principal textile manufacturing regions, namely the European Union, China, and the United States. By leveraging on best practices conducted by fashion and textile firms, the chapter presents case studies that exemplify efforts toward ecologically friendly activities in the major textile economies and outlines key recommendations for firms and governments to follow on in the footsteps of the cases discussed. Chapter 3 focuses on Spanish fashion companies and their efforts to better communicate their achievements in terms of behavioral indicators over the past two decades. Relying on research on one thousand consumers and their perception of the reports and communications issued by 21 Spanish fashion brands, the authors aimed to understand their perception on the credibility of the sales arguments to what extent these brands are associated with sustainable behavior or greenwashing. Chapter 4 presents a case study on Jeanealogia, a Spanish firm that has been innovating in sustainability in jean production processes for over thirty years and which offers their technology and consulting services to top global brands, including Levi Strauss. One of the aims of this chapter is to showcase a business model that can be replicated in different textile manufacturing hubs. Chapter 5 addresses consumer behavior and

how fast fashion has had a negative impact on society and the environment. A robust research study, it aims to debunk myths over second-hand clothes ownership and to promote slow fashion and collaborative fashion consumption in Spain, a market which can benefit enormously from these three alternatives to advance on sustainability in the textile and fashion markets. Chapter 6 addresses the role of entrepreneurs in the sustainability in the textile industry and looks into crowdfunding initiative that permit to foresee future trends in this industry. The chapter relies on research that explores ideas from fashion entrepreneurs on mindful consumption, highlights implications, and addresses mindful production as a prerequisite to mindful consumption. Finally, Chap. 7 closes the book by analyzing the circular economy strategies in the luxury fashion industry. More specifically, this chapter presents the case of the renowned firm LVMH and its efforts to promote responsible consumption, based on a qualitative and quantitative study that leverages artificial intelligence in content analysis.

The seven chapters comprising this book are authored by renowned researchers in the fields of textile industry and sustainability, and are the product of extensive research efforts. It is our hope that *Sustainable Threads: Collaborative Consumption, Technology, and Green Innovation in Textile* helps inform both consumers and producers globally of current endeavors in sustainability in the textile industry to raise awareness of its importance across all the value chains in the textile industry, and to provide decision makers with a valuable tool for analysis and implementation.

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Chapter 1

Textile Industry and Sustainability: An Integrated Examination



**Cristina Blanco González-Tejero, Samuel Ribeiro-Navarrete, Raquel Diaz,
and Ruben Furio-Piqueres**

1.1 Introduction

Fashion and, in particular, the textile industry have undergone a significant transformation in recent decades. In addition, its link with sustainability, and specifically the circular economy, has been a central topic of analysis in research such as that proposed by Jia et al. (2020).

The textile and fashion industries harm the environment by significantly contributing to water, air, and solid waste pollution, increasing the threats of environmental damage and global warming to living species (Plakantonaki et al., 2023). Research highlights the urgent need to address climate change, particularly in relation to financing and the associated risks, (Shahrour et al., 2023). Thus, this is a dimension that connects all entities integrated into society. In sum, achieving sustainability in our development has been an enduring and significant challenge for humanity (Li et al., 2023).

The evolution of the garment and fashion industry is propelled by a confluence of factors, encompassing technological advances, shifts in consumer preferences, and a heightened environmental consciousness. Consequently, innovation within this

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industry is progressively influenced by the dual pillars of sustainability and technological advancements (Larsson, 2018). In that sense, understanding the behaviour of textile companies regarding the use and discharge of chemicals is crucial for designing environmental risk management strategies (Ho & Watanabe, 2020).

The 2030 Agenda has accelerated international cooperation and diplomacy to address global issues. As indicated by Lafont-Torio et al. (2023), the 2030 Agenda includes 169 global goals that provide a global guide for building a fairer world, and, in addition to its ethical and social justice connotations, its achievement increasingly impacts businesses. The influence of the 2030 Agenda on the textile industry is thus particularly relevant due to the environmental and social challenges inherent to this industry. In a constantly growing and developing world, the pursuit of the latest fashion trends and the accelerated consumption cycle has led to an increase in the production and consumption of clothing. However, this unbridled expansion has had significant consequences for the environment and local communities. In this sense, governments have sought to raise awareness and develop policies that make visible the existing needs of society, proposing measures and strategies towards sustainable development (Xie et al., 2021). The fashion industry is of such economic and business relevance that understanding the influence of sustainability in its processes and supply chain has led to a growing interest in academic research. Thus, authors such as Cai and Choi (2020), analyse the existing body of scientific papers in this field. Therefore, this chapter arises with the aim of continuing the exploration of existing research from a new perspective, thus generating new insights and innovative approaches to address the challenges of sustainability in the fashion industry. Thus, a literature review focused on the analysis of the most representative topics related to the textile industry and its sustainability is proposed. Consequently, this chapter is oriented to the review of trends, thus being able to identify gaps to be explored and highlight emerging perspectives that require attention for future research.

This chapter is presented as follows. Firstly, it considers the relevant trends and main developments in the research area, highlighting the research gap. This is followed by an analysis that considers the main scientific documents listed in the Web of Science (WoS) database. After this, the fundamental ideas and key results are detailed. Subsequently, the conclusions and implications of the chapter are presented, detailing new lines of research. Specifically, this literature review allows positioning of the topic of sustainability in the textile industry, considering the main related issues and the relevance of factors and elements involved in manufacturing and consumption processes.

1.2 Theoretical Background

The overconsumption and rapid production of fashion have a significant impact on our planet. From water pollution to overexploitation of natural resources and the generation of non-biodegradable textile waste, the textile industry has become one of the most polluting industries in the world. This has led to an urgent call for the

adoption of more sustainable practices. Societies are changing their production and consumption systems to ensure sustainability and the well-being of future generations (Broega et al., 2017).

1.2.1 The Sustainability Challenge

Sustainability is defined in three social, environmental, and economic dimensions, and to achieve full sustainability, processes must consider all three areas (Mahmoudi & Rasti-Barzoki, 2018). Growing consumer interest in durable and functional clothing made in a sustainable manner has created an opportunity for the incorporation of new materials (Yetisen et al., 2016), creating an opportunity for those who design an optimal strategy.

The quest for sustainability has motivated companies to incorporate more environmentally friendly practices into their processes, but the textile industry still faces environmental challenges, such as water pollution and emissions, despite its attempts at recycling (Sharma et al., 2021). Yusuf et al. (2017) emphasise the growing public demand for natural colorants in the textile industry. There are many contaminants in textile wastewater (Li et al., 2019), so the contamination of this industry is of great concern. Thus, Sarkar et al. (2017) underscore the importance of devising environmentally friendly and cost-effective approaches to tackle water pollution stemming from the textile industry. In that sense, the increasing consumer demand for eco-friendly materials has led to a surge in the use of sustainable plant-based products in the textile industry, offering enhanced functionality and environmental benefits (Shahid & Mohammad, 2013b). Thus, companies have incorporated sustainable policies and practices into their supply chains as an essential step to improve operational efficiency, with benefits such as improved environmental, social, and economic performance (Aytekin et al., 2023).

1.2.2 Business

In response to growing global environmental awareness and competition in international markets, textile companies are driven to adopt environmentally responsible practices (Lai et al., 2012). Competitiveness of companies relies on building an efficient team and a collaborative environment, impacting product quality across all industries (Ogunrinde, 2022). Many of them use sustainability as a strategy to gain competitive advantage, differentiate themselves, and improve their public image and reputation (Shiwanthi et al., 2018).

The textile industry, due to its high competitiveness, plays a key role in driving international trade relations in the context of trade integration, as its relative advantage stimulates trade and exchange between countries around the world (Tseng et al., 2022). Thus, it is one of the largest industries and is adopting sustainable management

concepts in its supply chain (Lim et al., 2017). Thus, the challenge for the fashion and textile industry has been to proactively address sustainability, driven by pressure from shareholders or consumers seeking corporate social responsibility rather than government regulations (Na & Na, 2015).

Although sustainability is driven by the rapid evolution of Industry 4.0, changing the way businesses operate and optimism about the opportunities it provides for sustainability offers promising opportunities (Khan et al., 2023), the tools available for sustainable fashion design are often complex, and costly. Consequently, adopting green and eco-friendly materials entails an additional cost that increases the investment of organisations in the textile industry (Tumpa et al., 2019). Based on the theoretical framework developed, the following research questions (RQ) are posed:

RQ1: What is the academic relevance of the textile industry in relation to sustainability?

RQ2: Which countries are the main producers of scientific papers in this area?

RQ3: Which terms are associated with the sustainability of the textile industry?

1.3 Methodology and Analysis

In order to address the research questions posed previously, a systematic literature analysis has been developed. This topic has been widely considered by authors such as Harsanto et al. (2023) who already highlighted the demand for green products and systematically analysed some documents linked to the textile industry.

This analysis constitutes a systematic literature review as it adopts a reproducible, scientific, and transparent process (Tranfield et al., 2003). Thus, the search was carried out in the Web of Science database, following the search query: “textile industry” AND (“SDGs” OR “sustainable” OR “green” OR “green economy”) selecting the category title or abstract. With these criteria, a total of 874 scientific documents were obtained in August 2023. This is followed by an analysis of the terms broadly considered and the relationship between them. In this case, an analysis of the conceptual structure between the analysed articles is carried out. In particular, the Bibliometrix R package is used as a scientometric software tool. For the visualization of the information, Bibliometrix is used, which allows the visualization of different attributes at the same time in Sankey charts (Linnenluecke et al., 2020).

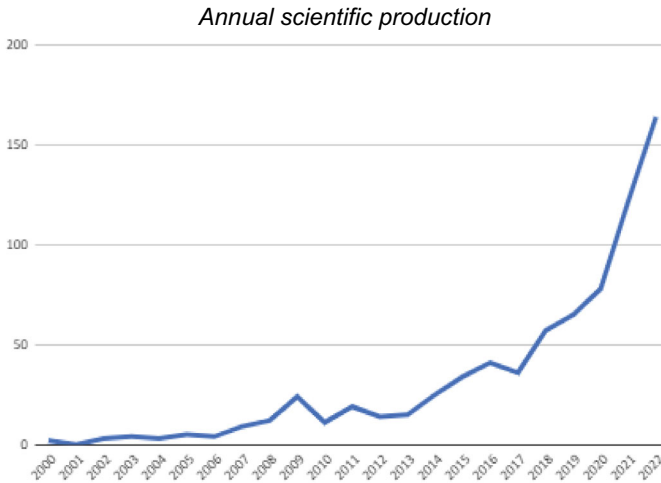


Fig. 1.1 Annual scientific production. *Note* This figure shows the steep increase in scientific output from 2017 on textile industry and sustainability-related terms such as SDGs, green and green economy. *Source* Web of Science, 2023

1.4 Results

1.4.1 Annual Production

Annual scientific production increases notably from 2017, with the highest growth from 2020 onwards. Even so, there was an annual growth of 19.74% in the period analysed. The growth of the world's population is directly responsible for the increase in the production and consumption of textile products (Periyasamy, 2023), which is why issues related to textile sustainability have aroused the interest of many researchers and business leaders. In total, there is an average of 17.72 citations per paper per year and a total of 41,814 references between all documents (Fig. 1.1).

1.4.2 Academic Production by Country

China, a key textile exporter, faces serious energy and environmental challenges due to inefficient use of resources and high levels of pollution (Xu et al., 2018). Thus, it is relevant to consider that the countries that seemingly have the highest risks and present the most challenges in terms of sustainability of textile industrial management are also the ones where there is the highest awareness among researchers. In turn, India, followed by Brazil and Pakistan are the territories with the highest scientific production. Table 1.1 shows that India leads in citations with a total of 2749 citations.