



**UNIVERSITÀ
DEGLI STUDI
DI PADOVA**

**DIPARTIMENTO DI SCIENZE
ECONOMICHE E AZIENDALI
“MARCO FANNO”**

UNIVERSITA' DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI “M.FANNO”

CORSO DI LAUREA MAGISTRALE IN BUSINESS ADMINISTRATION

MASTER THESIS

CIRCULAR ECONOMY IN FASHION INDUSTRY:

A SYSTEMATIC LITERATURE REVIEW AND RESEARCH AGENDA

Supervisor:

Professor Giuseppe Danese

Student:

Fatemeh Karimkhan (2005541)

Academic Year 2023 – 2024

Declaration of Authenticity

Il candidato dichiara che il presente lavoro è originale e non è già stato sottoposto, in tutto o in parte, per il conseguimento di un titolo accademico in altre Università italiane o straniere.

Il candidato dichiara altresì che tutti i materiali utilizzati durante la preparazione dell'elaborato sono stati indicati nel testo e nella sezione "Riferimenti bibliografici" e che le eventuali citazioni testuali sono individuabili attraverso l'esplicito richiamo alla pubblicazione originale.

The candidate declares that the present work is original and has not already been submitted, totally or in part, for the purposes of attaining an academic degree in other Italian or foreign universities. The candidate also declares that all the materials used during the preparation of the thesis have been explicitly indicated in the text and in the section "Bibliographical references" and that any textual citations can be identified through an explicit reference to the original publication.

Fatemeh Karimkhan



I dedicate this thesis to those who left their homes, not by choice but by necessity, for a better future. Embarking on a journey toward the hope of building a better future. To the dreamers, the fighters, the resilient spirits who navigate the uncertainty of new beginnings, carrying the weight of their past and the promise of their dreams. To the courageous women of my country, my home, Iran.

Women, Life, Freedom

Acknowledgment

I would like to express my deepest appreciation to Professor Giuseppe Danese, whose guidance, support, and encouragement have been invaluable throughout this journey. Professor Danese's wisdom and mentorship have been a cornerstone of my research, and I'm truly thankful for that.

I am also grateful to my family and friends who have been my constant support throughout my academic journey. Their love, encouragement, and unwavering belief in me have been a source of strength and motivation.

Fatemeh Karimkhan

Abstract

The thesis systematically reviews the literature on the circular economy in the fashion industry, analyzing the transition from traditional, linear models to sustainable, circular practices.

It begins with a broad bibliometric analysis to map the scholarly landscape of circular economy practices in the fashion industry, utilizing Bibliometrix for a structured, comprehensive examination of relevant literature. The research further identifies three precursors to circularity: regulations, idiosyncratic motives, and value chain considerations exploring their influence on circular strategies within the industry. In the latter part of the abstract, the focus narrows to explore how these precursors—regulations, unique motivational drivers, and value chain considerations—give rise to specific circular strategies in the fashion industry. By dissecting the impact of these foundational elements, the study reveals their crucial role in catalyzing the adoption of circular practices, which are essential for mitigating the environmental footprint of the fashion sector. The thesis highlights the emergence of innovative circular strategies as a direct consequence of these precursors, offering a fresh perspective on the pathway towards circularity in fashion.

Table of Contents

| | |
|---|----|
| 1. Introduction | 9 |
| 2. Research Background..... | 13 |
| 2.1. Methodology | 13 |
| 2.2. Bibliometric Analysis | 14 |
| 2.2.1. Main Information..... | 14 |
| 2.2.2. Annual Scientific Production | 15 |
| 2.2.3. Average Citations Per Year | 17 |
| 2.2.4. Most Relevant Sources | 19 |
| 2.2.5. Bradford's Law | 21 |
| 2.2.6. Sources' Production Over Time..... | 22 |
| 2.2.7. Sources' Local Impact | 24 |
| 2.2.8. Most Relevant Affiliations..... | 27 |
| 2.2.9. Corresponding Author's Countries | 29 |
| 2.2.10. Countries' Scientific Production..... | 30 |
| 2.2.11. Most Cited Countries..... | 31 |
| 2.2.12. Most Globally Cited Documents | 33 |
| 2.2.13. Most Frequent Words | 34 |
| 2.2.14. Words' Frequency Over Time..... | 36 |
| 2.2.16. Thematic map | 40 |
| 2.2.17. Co-occurrence Network..... | 42 |
| 2.2.18. Co-citation Network | 44 |
| 3. Content analysis | 47 |
| 3.1. Methodology | 47 |
| 3.1.1. Systematic literature review | 47 |

| | | |
|--------|--|----|
| 3.1.2. | PRISMA Framework | 48 |
| 3.1.3. | MAXQDA | 50 |
| 3.2. | Thematic Analysis..... | 51 |
| 3.2.1. | Regulations and industry standards | 53 |
| 3.2.2. | Idiosyncratic Motives | 59 |
| 3.2.3. | Value chain considerations | 73 |
| 4. | Conclusion:..... | 81 |
| 4.1. | Key Findings..... | 81 |
| 4.2. | Theoretical and Practical Implications | 82 |
| 4.3. | Limitations and Future Research | 82 |
| 4.4. | Final Thoughts | 83 |
| 5. | Appendices | 84 |
| 6. | Reference..... | 93 |

Figures and tables

| | |
|---|----|
| Figure 2.1: Main Information, Bibliometrix Tool | 15 |
| Figure 2.2: Annual Scientific Production, Bibliometrix Tool..... | 17 |
| Figure 2.3: Average Citations Per Year, Bibliometrix Tool | 19 |
| Figure 2.4: Most Relevant Sources, Bibliometrix Tool..... | 20 |
| Figure 2.5: Core Sources by Bradford’s Law | 22 |
| Figure 2.6: Sources’ Production Over Time, Bibliometrix Tool | 23 |
| Figure 2.7: Sources’ Local Impact by H Index, Bibliometrix Tool | 26 |
| Figure 2.8: Most Relevant Affiliations, Bibliometrix Tool | 28 |
| Figure 2.9: Corresponding Author’s Countries, Bibliometrix Tool..... | 30 |
| Figure 2.10: Most Cited Countries, Bibliometrix Tool..... | 32 |
| Figure 2.11, Most Global Cited Documents, Bibliometrix Tool | 33 |
| Figure 2.12: Most Relevant Words, Bibliometrix Tool | 35 |
| Figure 2.13: Most Relevant Words, Bibliometrix Tool | 36 |
| Figure 2.14: Word’s Frequency over Time, Bibliometrix Tool | 38 |
| Figure 2.15: Trend Topics, Bibliometrix Tool | 40 |
| Figure 2.16: Thematic Map, Bibliometrix Tool..... | 41 |
| Figure 2.17: Co-occurrence Network, Bibliometrix Tool | 43 |
| Figure 2.18: Co-citation Network, Bibliometrix Tool..... | 44 |
| Figure 3.1: PRISMA 2020 Flow Diagram, (http://www.prisma-statement.org/) | 49 |

1. Introduction

The global fashion industry holds power with a value of around \$450 billion. However, it also has an impact ranking as the second largest polluter worldwide, surpassing even maritime transportation and international flights (Hugo et al., 2021).

The fashion industry's linear economy model is characterized by a "take-make-waste" approach, which results in significant environmental and economic inefficiencies. This model entails the extraction of raw materials, the production of goods, and the eventual disposal of these items, often in landfills (Mishra et al., 2020). It is using large amounts of renewable materials to make clothes that often do not last long before being discarded or burned in landfills. This approach leads to a loss of \$500 billion and contributes significantly to greenhouse gas emissions surpassing those from global air travel and shipping combined (Ellen MacArthur Foundation, 2017).

The fast fashion phenomenon, characterized by quick style turnovers and frequent collections, has amplified the challenge by increasing consumption. As a result, over 60% of purchased clothing goes to waste, exacerbating the industry's sustainability dilemma (Avadanei et al., 2021).

In response to these challenges, Fashion companies are increasingly adopting circular economy principles to transition away from linear fashion models characterized by high waste and environmental impact. By integrating strategies that focus on sustainability across all stages of the supply chain, from production to consumption, these companies aim to reduce waste and promote the reuse and recycling of garments (Hirscher et al., 2018)

The transition to a circular economy offers a potential solution to the fashion industry's predicament. The industry can mitigate its negative impacts by transforming the current linear model, which leads to waste and pollution, into a closed-loop system that promotes recycling and reusing materials (Abdelmeguid et al., 2022).

The linear model of resource consumption follows a "take-make-dispose" pattern. This model depends on having easy access to large amounts of resources and energy, and simply aiming for greater efficiency, such as reducing resource and fossil energy usage per unit of production, won't change the fact that these resources are limited (Ellen MacArthur Foundation, 2013).

Although the linear economy was highly influential in generating material wealth in industrialized nations until the 20th century, it has shown weaknesses in the new millennium and a complete breakdown is predicted to occur in the near future (Sariatli, 2017).

Shifting from a linear economy to a circular economy has gained significant attention from major corporations and policymakers in recent years. However, the concept has been discussed since the 1970s (Wautelet, 2018). The circular economy tries to maximize the lifespan of products and materials through strategies like sharing, leasing, reusing, repairing, refurbishing, and recycling. Instead of the usual “take-make-dispose” model, the circular economy approach lets resources be used and passed around more than once. By keeping products in use longer, their life cycles are extended. This method cuts down on waste by recycling materials and goods that can be used again. In this way, materials can be productively utilized over and over to generate additional value (European Parliament, 2023).

Transitioning to a circular textile economy is not only an environmental imperative but also essential for maintaining the industry's profitability. If the industry maintains its current trajectory, it could consume more than a quarter of the carbon budget associated with a 2°C warming limit by 2050. This would not only exacerbate environmental issues but also jeopardize profitability, with brands potentially facing a significant decline in earnings by 2030 (Ellen MacArthur Foundation, 2017).

This study aims to conduct an in-depth systematic literature review on the subject of circular economy in the fashion industry. There are many good reasons for doing a systematic review of the circular economy in the fashion industry. Circularity in the fashion and textile industry is a new area of research crossing multiple fields like design, engineering, sustainability, and business. Some solutions like recycling textile materials and clothing rentals have been proposed, however, the evidence supporting what actually works is not easy to find and they are placed among different journals and reports. This methodological assessment will help to accumulate all the knowledge on potential challenges and opportunities in this sector, along with showing the future paths. Having a solid base of knowledge can make policies and discussions move forward.

A systematic review can map this complex literature landscape by synthesizing findings on the feasibility, challenges, and opportunities of circular fashion innovations.

This big-picture perspective is helpful for both scholars and industry leaders. Conducting a systematic literature review on the circular economy in the fashion industry is critically needed due to the urgency of transforming this polluting sector, the fragmented state of research, and the lack of a holistic perspective.

The urgency to transition from a linear to a circular fashion industry is underscored by the sector's substantial environmental impact, characterized by excessive resource consumption and waste generation. The current fast fashion trend exacerbates these issues, making it imperative to adopt circular economy practices that promote sustainability by minimizing waste and extending the lifecycle of garments. This transition is not only critical for environmental conservation but also for aligning with the increasing consumer demand for ethical and sustainable fashion options. The immediate adoption of circular principles is essential to mitigate the pressing environmental challenges posed by the fashion industry (Brydges, 2021).

The research landscape on circular economy (CE) within the fashion industry is notably scattered, with studies employing diverse approaches and focusing on varied aspects of circularity. Merli, Preziosi, and Acampora (2018) provide a systematic literature review that underscores the diverse interpretations and applications of CE principles in fashion, revealing a broad but disjointed body of knowledge. The paper points out that while CE is increasingly recognized for its potential to address the environmental challenges of the fashion industry, the research remains fragmented across different themes such as waste management, sustainable design, and consumer behavior. This fragmentation reflects the complexity of fully integrating CE principles in the fashion industry and highlights the need for a more unified research agenda that can offer coherent strategies for transitioning towards a more sustainable and circular fashion system (Merli et al., 2018). (Jia et al., 2020) published a valuable systematic literature review in 2020. This systematic literature review focused on papers published from 2002 until 2019. 109 papers were reviewed and analyzed in the study. They Did a thematic analysis by inductively coding the papers into 4 main themes: Drivers, Barriers, Practices, and indicators of sustainable performance when applying circular economy in the textile and apparel industry.

The paper (Jia et al., 2020) reviewed existing literature and suggested a conceptual model Based on these four themes, which illustrates the relationship between them.

The objective of this thesis is to discover the present state of research on circular economy in the fashion industry. We specifically chose discussing circular economy in the fashion industry

because as we mentioned before the fashion industry ranks as the second most significant contributor to pollution globally, surpassed only by the oil sector (UN News, 2019). Furthermore, it stands as the second-largest industry in consumer expenditure, trailing only behind the food and beverage sector (Ellen MacArthur Foundation, 2013).

Throughout our systematic literature review, we identified three precursors of circularity in the fashion industry. These precursors are regulations and industry standards, idiosyncratic motives, and value chain considerations. Each of these precursors produces different kinds of circularity strategies. Then we went through all the emerging strategies from each precursor and categorized the strategies and explained their adoption drivers

During our comprehensive literature review, we uncovered three foundational elements that serve as precursors driving circularity within the fashion sector. These foundational elements encompass regulatory frameworks and industry benchmarks, idiosyncratic organizational motives, and value chain considerations. The interplay of these precursors gives rise to a diverse array of circularity strategies, each characterized by its unique approach and objectives. Delving deeper, we systematically analyzed the strategies that emerged from each precursor, categorizing them meticulously. Furthermore, we explored the underlying drivers that facilitate the adoption of these strategies, shedding light on the complex mechanisms that encourage sustainable practices in the fashion industry. This nuanced examination not only highlights the multifaceted nature of circularity but also paves the way for a more sustainable and responsible fashion ecosystem.

By meticulously examining the precursors to circular economy strategies in the fashion industry, our thematic analysis offers a profound insight into the foundational elements that catalyze the adoption of sustainable practices. This emphasis on precursors—regulations and industry standards, idiosyncratic motives, alongside value chain considerations—provides a nuanced lens through which to view the genesis of circular strategies. The exploration of these precursors and their direct connection to the emergence of specific circular strategies is of paramount importance for several reasons.

The remainder of this thesis is organized as follows: chapter 2 is dedicated to a comprehensive bibliometric analysis, while Chapter 3 focuses on content analysis. Both chapters commence with a detailed explanation of the methodologies employed in their respective analyses.

2. Research Background

2.1. Methodology

For this analysis, we used Bibliometrix which is an R-based software package that allows users to perform bibliometric analysis on scientific literature. It follows a recommended workflow for bibliometric studies that involves several steps employing diverse analyses and mapping software tools. Bibliometrix automates this workflow into an organized data flow within the R programming environment (Aria & Cuccurullo, 2017). It can be used to analyze citation networks, co-authorship networks, and keyword co-occurrence networks, among other things.

The first step is data collection. To conduct the analysis, academic papers were retrieved from the Scopus database on 17th of August, 2023, using the following comprehensive search query with relevant keywords:

```
(TITLE-ABS-KEY ( circular* AND ( fashion* OR cloth* OR textile* OR apparel* OR garment* OR sartorial* ) ) AND ( LIMIT-TO ( SUBJAREA , "BUSI" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) )
```

This query focused on papers with terms related to a circular economy (circular*) and the fashion industry (fashion*, cloth*, textile*, apparel*, garment*, sartorial*) in the title, abstract, or keywords. Results were limited to English language papers categorized under the business subject area in Scopus.

Now that the data are collected, the next step is conducting analyses to understand patterns in the publications. Bibliometrix has functions to perform descriptive analyses of trends over time, contributors, sources, and other variables. It can create networks based on citation, bibliographic coupling, co-citation, or collaboration analysis. These networks are normalized using similarity measures to identify connections between publications, authors, references, etc. Conceptual structure mapping uses multiple correspondence analysis and clustering techniques to generate a term co-occurrence network (Aria & Cuccurullo, 2017).

The next step involves creating representations through the use of graphs and maps. Scholars can plot trends, citations, and collaborations. Additionally, you have the option to visualize networks using layouts and parameters. Another useful tool is generating structure maps that illustrate the connections between research topics and themes.

Now that the data collection is done and 803 papers have been extracted from Scopus, let's delve into the analysis.

2.2. Bibliometric Analysis

2.2.1. Main Information

Initiating the discourse with the primary data, the chronological span of the dataset encompasses publications from 1961 to 2023, collectively representing over six decades of scholarly research. This extensive timeframe underscores the long-standing and evolving exploration of the circular economy within the fashion industry. An examination of the dataset reveals the accumulation of 802 documents sourced from an impressive diversity of 192 sources. This wide-ranging collection signifies the interest of business mediums in fashion, encompassing an array of mediums including, but not limited to, books and academic journals. Notably, the quantity of these publications has exhibited a steady increase at an annual rate of 6.61%, a trend that corresponds with the escalating global concern regarding environmental issues and the sustainable impact of the fashion industry. Analyzing the age of the documents within this collection, the average stands at approximately 12.2 years. This average age indicates a balanced amalgamation of both longstanding and recent research. Predominantly, the majority of these works are of recent origin, reflecting an intensified focus on sustainability in recent years. The dataset covers a period of 62 years, from 1961 to 2023, an average age of just over ten years appears relatively young in terms of academic research as a whole.

On average each document has around 8.61 citations. It is calculated by dividing the total number of citations by the total number of papers. This can be a very useful metric to assess the average impact for a journal or author (Anne-Will Harzing, 2010).

In total, there are 16,115 references scattered throughout the documents. These references showcase a tapestry of interconnected knowledge demonstrating an extensive body of literature.

Examining the 2,231 keyword-plus terms and 1,224 authors' keywords reveals an indexing effort and the use of keywords to represent the topic effectively. Author Keywords consist of a list of terms that authors believe best represent the content of their paper (Zhang et al., 2016). Keywords Plus, generated by an automatic computer algorithm, are words or phrases that appear frequently in the titles of an article's references and not necessarily in the title of the article or as

Author Keywords (Eugene Garfield & Irving H. Sher, 1993). Therefore, Keywords Plus terms have been used to identify research trends in a variety of scientific fields.

The dataset consists of a total of 1,189 authors with 206 of them being authors of single-authored docs. This suggests the level of collaboration among researchers. While most documents, 286 of them, are authored by individuals there is an average of 1.73 co-authors per document. This means that on average there is more than one author per document which is relatively low in scientific research and may indicate that single authorship or small teams are common in this field.

12.59% of the documents represent international collaboration between authors. While not insignificant, it suggests that there is room for increasing global collaboration in this research area.

Based on the bibliometrix report, the most common document type is journal articles (664), followed by book chapters (63) that represent more in-depth treatments of the subject and are significant for disseminating knowledge beyond journal articles and conference papers (24) that indicate ongoing research discussions and the presentation of new findings in academic and professional settings.

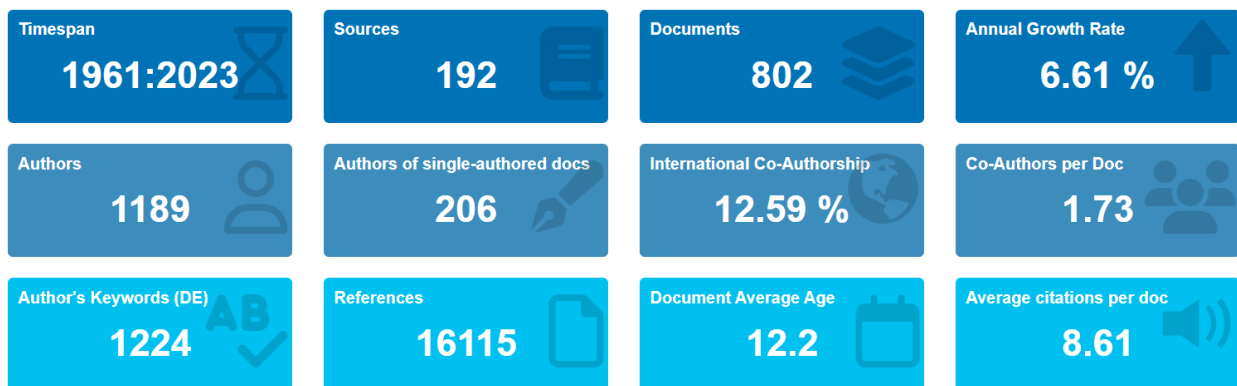


Figure 2.1: Main Information, Bibliometrix Tool

2.2.2. Annual Scientific Production

Delving into the annual scientific production analysis reveals the number of publications per year spanning from 1961 to 2023. Notably during the 1960s, During the 1960s, three papers were published that concentrated on the intricate technical processes involved in creating circular textiles, delving into advancements in yarn production, weaving, and knitting technologies. This period represents the stages before the field truly emerged. Moving into the 1970s there was still

production with one paper published in 1978. It became evident that the field was not yet fully developed at that time. However, as we entered the 1980s there was an acceleration in growth. The study area gained recognition and academics began showing interest in it.

There was a steady flow of studies starting in the 1990s. This rise shows that the fashion industry is becoming more aware of sustainability problems. This may be because the environmental movement is growing around the world. However, the short-term drop at the end of the decade could be due to uncertainty about the direction of study or shifting priorities. Entering the 21st century, there is a clear and robust growth in publications, with the numbers rising from 20 in 2000 to 47 in 2005. We can see in the illustration one of the two major peaks in this year, likely coinciding with increased public consciousness regarding climate change and the environmental impact of industries. Since the fashion industry uses a lot of resources and makes a lot of waste, it makes sense that it would be looked at closely. This would lead to more study into the circular economy as a possible solution.

During the mid-2000s to 2010s, there were fluctuations in output. It remained consistently higher than before. This could be attributed to factors such as funding cycles, shifting priorities or economic considerations.

There was a decline between 2010 and 2017 followed by a resurgence. By 2018 the number of articles significantly increased to 32. Then rapidly accelerated to reach 80 in 2021. This is the second major peak that can be seen in the illustration. This year has the most publications in the whole period.

The slight decrease observed in 2022 and 2023 might be due to publishing delays or a natural stabilization after the expansion.

Overall, there has been an increase in publications related to the economy's significance in fashion as an academic field. The data highlights how scholarship has evolved in addressing circularity concerns with years emphasizing a need for industry transformation.

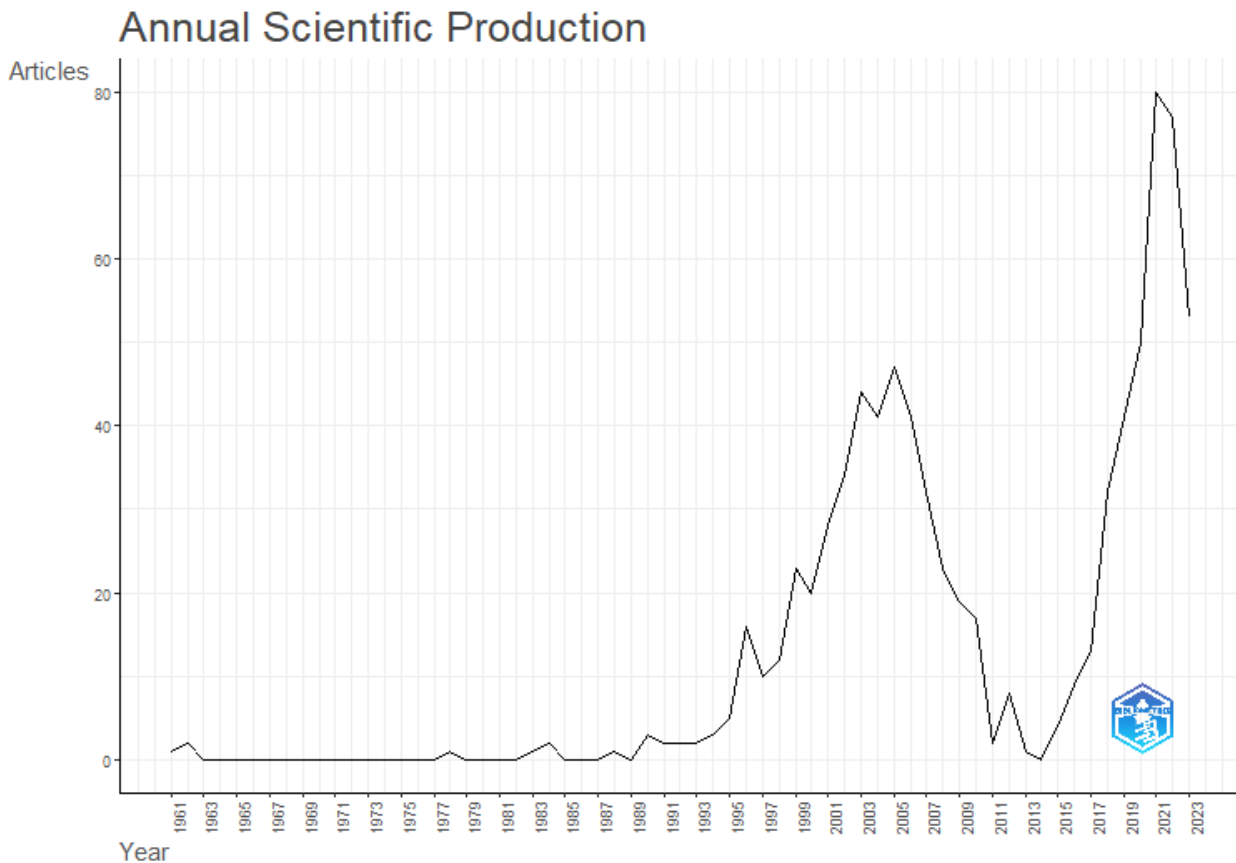


Figure 2.2: Annual Scientific Production, Bibliometrix Tool

2.2.3. Average Citations Per Year

Studying the patterns of citations can offer insights into the long-term impact and relevance of research. Groundbreaking studies in a field are often recognized through citations that highlight their importance. By examining citation trends, we can identify which topics and papers continue to attract attention and which ones fade away over time. This analysis essentially provides a map of the level of interest in concepts. Additionally, we can observe how scholars engage with and expand upon research by examining their references. Therefore, citations serve as a trail that tracks the evolution of topics from being on the fringes to gaining mainstream recognition.

The data here covers more than 60 years, from 1961 to 2023. In the early decades, there were just a handful of publications on circular fashion, with fewer than 2 articles per year until the mid-1990s.

Approaching the 2000s, we see the average citations per article slowly increase, peaking at 1.95 in 2000. The increase indicates that the concept of a circular economy was gaining traction as a theoretical interest before its practical implementation in the fashion sector.

Overall, long-term citation trends trace the evolution of topics from fringe concepts to mainstream adoption. Examining this transition allows us to understand the shifting academic influence within an emerging interdisciplinary field like sustainable fashion.

We can see a fluctuation from the mid-2000s to the early 2010s. Some years like 2005 have a higher average and others like 2003 have a very low average. We can see the year 2011 stands out with a high average citation rate of 5.5.

In 2015 we can observe the first peak with an average 49 number of citations per article and 5.44 per year. With only 4 articles published that year, we can indicate these 4 papers published in 2015 were very crucial for this field of study.

In 2017, the average number of citations per article peaked at over 100, which shows the research that year had a really high scientific impact. And we know 13 articles were published that year too. So combined, these metrics point to 2017 as a major turning point that accelerated circular economy research in fashion.

Moving to 2020-2023, we see the average citations decrease, even though publication volume remains high. There are a few possible reasons for this. Newer articles haven't had as much time to accumulate citations yet. And the field is maturing now, so it's harder for new work to stand out when the basics are already well covered.

Looking at the past 10-15 years holistically, it's clear there's been a distinct rise in productivity and influence in this space. The momentum is building, as demonstrated by both more publications and citation impact. Overall, the data shows this has become an established, prominent area of research, even if it's entering a new phase of development.

The field is both active and evolving, tracking bibliometric indexes into the future will reveal whether the circular economy in fashion continues on a growth trajectory or stabilizes at a certain level of research activity.

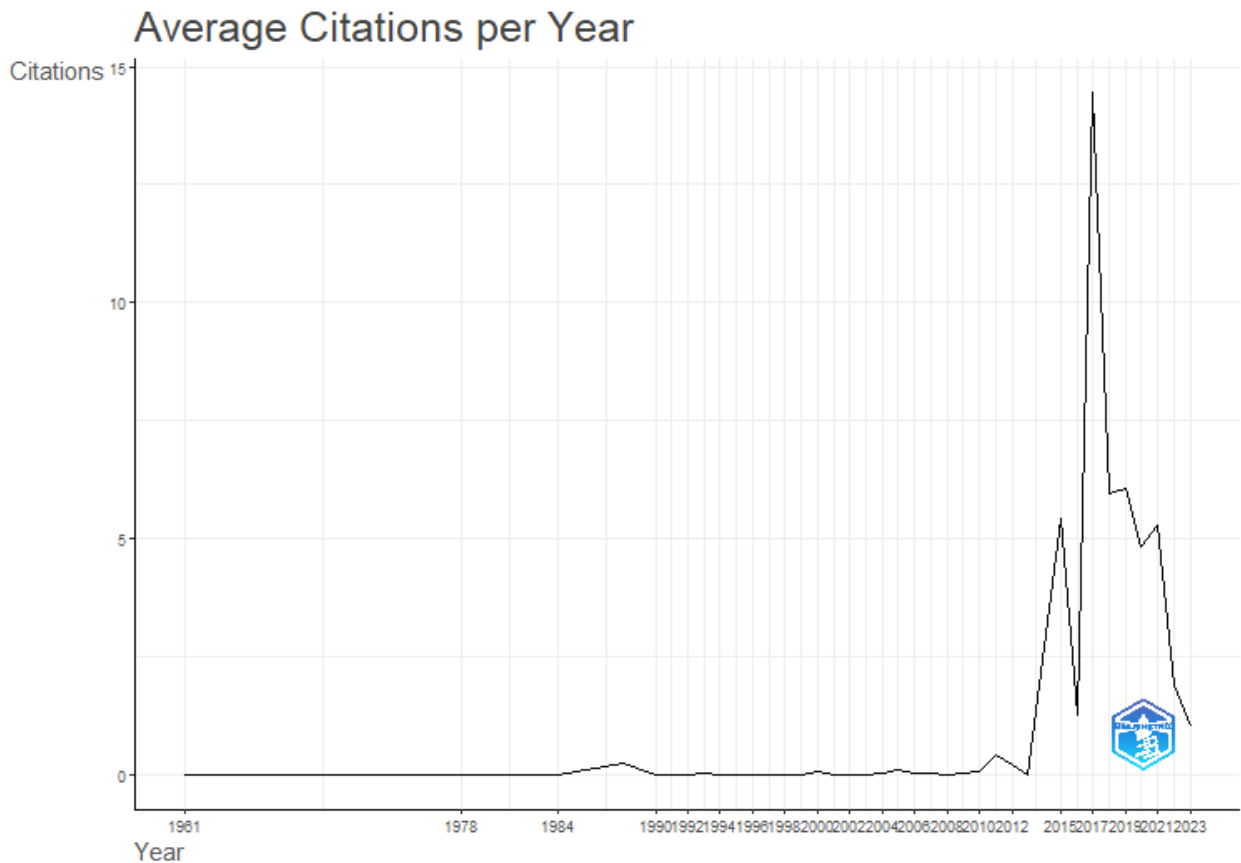


Figure 2.3: Average Citations Per Year, Bibliometrix Tool

2.2.4. Most Relevant Sources

To gain a robust understanding of the journals and publishers that are most central to our research domain, an analysis of source relevance should be conducted. It's clear that some journals and publications have done a better job in the dissemination of knowledge within this field.

Based on our information, The data covers publications across a diverse range of journals, conferences, books, and other outlets. The leading journal is *Knitting International* with 105 articles, reflecting the significant attention on circularity in knitwear manufacturing. *Knitting International* is a research journal that publishes research related to Business, Management and Accounting; Engineering; and Materials Science (journalsearches, 2023). The fact that *Knitting International* published the most articles highlights the importance of knitwear and knitted textiles within the fashion industry's transition to circularity. It indicates the crucial role of industry-specific publications in translating circular economy research into practical guidance.

Journal of Cleaner Production with 80 publications, is an international, transdisciplinary journal focusing on Cleaner Production, Environmental, and Sustainability research and practice. Through its published articles, it helps societies become more sustainable (ScienceDirect, n.d.). The prominence of the *Journal of Cleaner Production* indicates the crossover between circularity research and broader sustainability science. As a leading multidisciplinary journal, the *Journal of Cleaner Production* is connecting fashion circularity into wider discussions across industries.

Other major textile industry publications featuring prominently are *Textile Outlook International*, *Knitting Technology*, and *Textile Asia* with 34, 27, and 21 articles respectively showing specialization within the textile and knitting sectors.

Beyond specialty textile journals, certain sustainability-focused business journals have published extensively on this topic e.g., *Business Strategy and the Environment*.

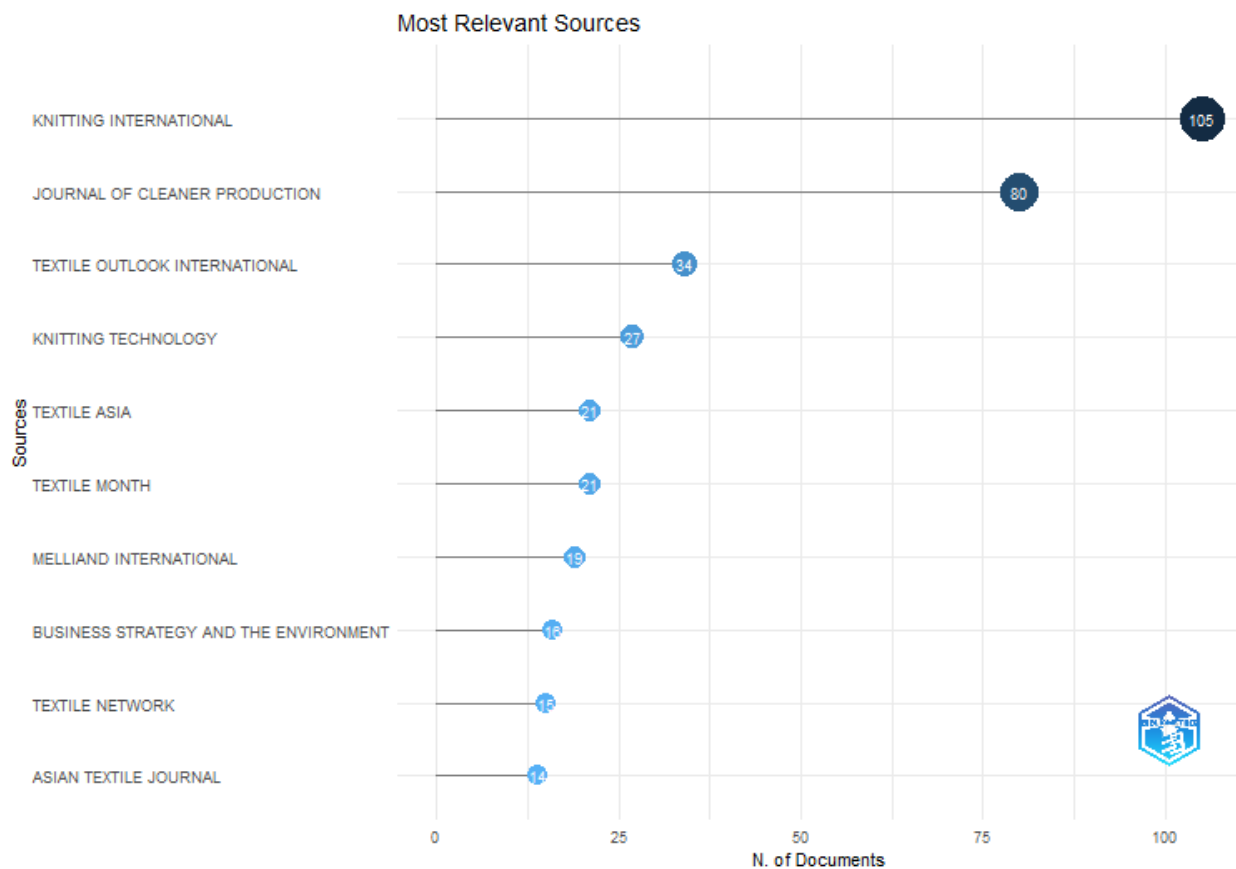


Figure 2.4: Most Relevant Sources, Bibliometrix Tool

The paper distribution highlights a diverse research landscape, covering new industry technologies, strategic business implications, and global viewpoints. The inclusion of prestigious journals indicates their status as trusted sources, while the broad range of publications reflects a holistic approach to addressing the complexities and opportunities offered by the circular economy in fashion.

2.2.5. Bradford's Law

To have a better insight into the pattern of literature dispersion across journals in a particular field or topic area, we use Bradford's law. Bradford's Law is a pattern first described by Samuel C. Bradford in 1934 that relates to the scatter of articles on a given subject in journals. It is often used in bibliometrics and information science for understanding the distribution of articles within journals and can help in the management of library journal collections, indicating which journals are core to a field and which are more peripheral.

Based on Bradford's Law scientific journals can be classified into three zones, each having an equal number of articles. As we move from zone to zone the number of journals increases while the number of articles per journal decreases. We can say that a core of journals will account for a large number of articles on a topic, while a larger number of journals will have fewer relevant articles.

The distribution shows a typical Bradfordian scatter. A small number of journals (the core) account for a significant proportion of the articles on the circular economy in the fashion industry. As you move to Zone 2 and then Zone 3, the number of articles per journal decreases, but the number of journals increases.

In a Bradford analysis, you would expect each zone to contain about one-third of all articles. In our database, Zone 1 includes *Knitting International*, *Journal of Cleaner Production*, *Textile Outlook International*, and *Textile Asia*, accounting for 267 articles. This is roughly one-third of the total 802 documents, which aligns with Bradford's Law. The subsequent zones (Zone 2 and Zone 3) would then be expected to contain the remaining two-thirds of the articles, with each zone having progressively more journals contributing fewer articles each.

The practical implication of this analysis for libraries and researchers is that by focusing on the journals in Zone 1, they can cover a significant portion of the literature on the circular economy

in the fashion industry without having to collect or read a vast number of more peripheral journals. However, for comprehensive literature reviews or for in-depth research, journals in Zones 2 and 3 may also need to be considered, as they may contain unique and valuable insights not found in the core journals.

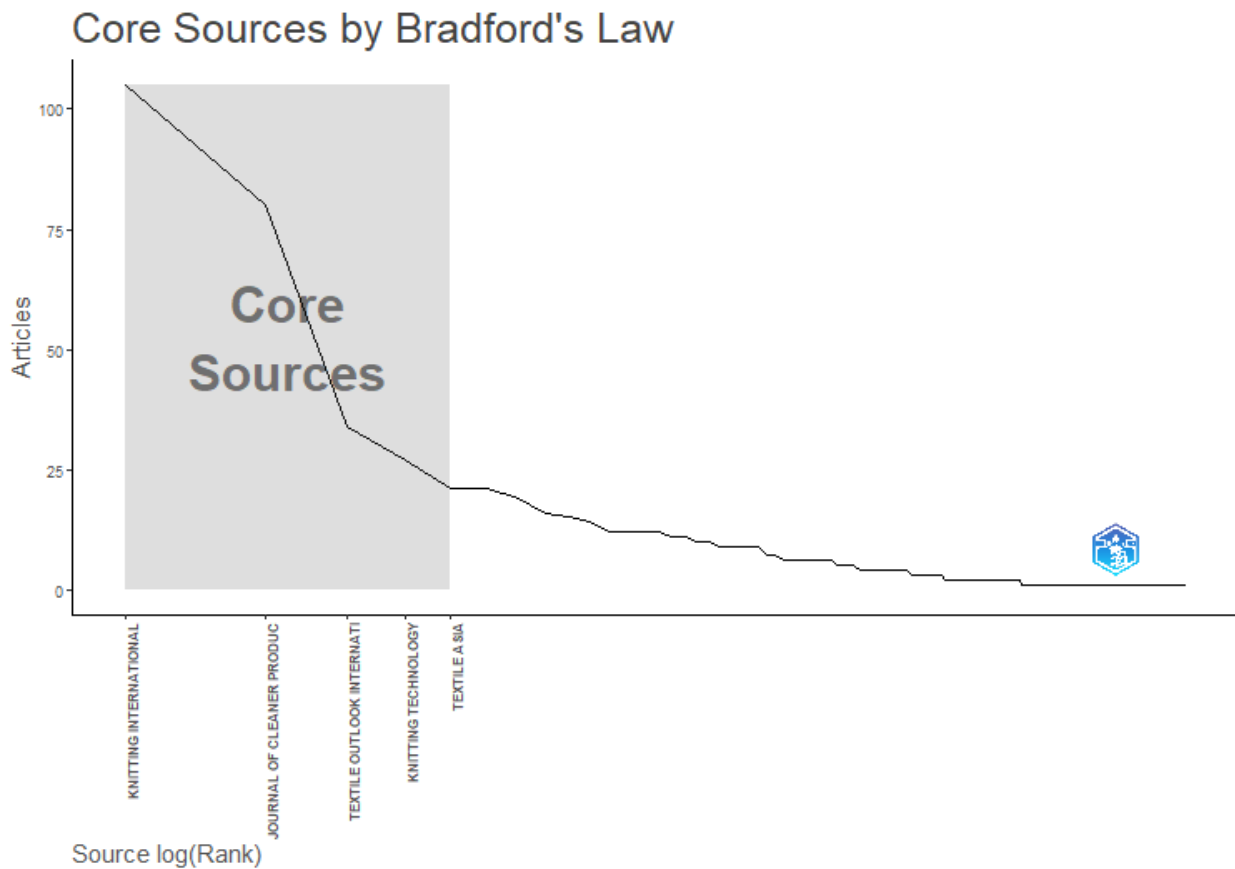


Figure 2.5: Core Sources by Bradford's Law

2.2.6. Sources' Production Over Time

Analyzing the source's production over time is crucial to understanding the evolution of the field and the growing interest in specific topics. we can see publication trends across five key sources from 1961 to 2023. It tells a story of minimal initial activity followed by rapid growth in recent decades. During the 1960s to 1980s, there were no publications indicating that sustainability was not a focus at that time. However, in the 1990s, *Knitting International* published its articles on

this topic showing recognition from the knitwear industry. This slow start is common in fields where a few pioneering studies establish a foundation for future research.

The 2000s marked a period of growth as sustainability gained traction. *Knitting International* experienced an expansion in its output reflecting its leadership role in knitwear. Other industry publications also increased. The rapid hockey stick growth over the 2010-2020 decade highlights circularity's emergence as a core priority.

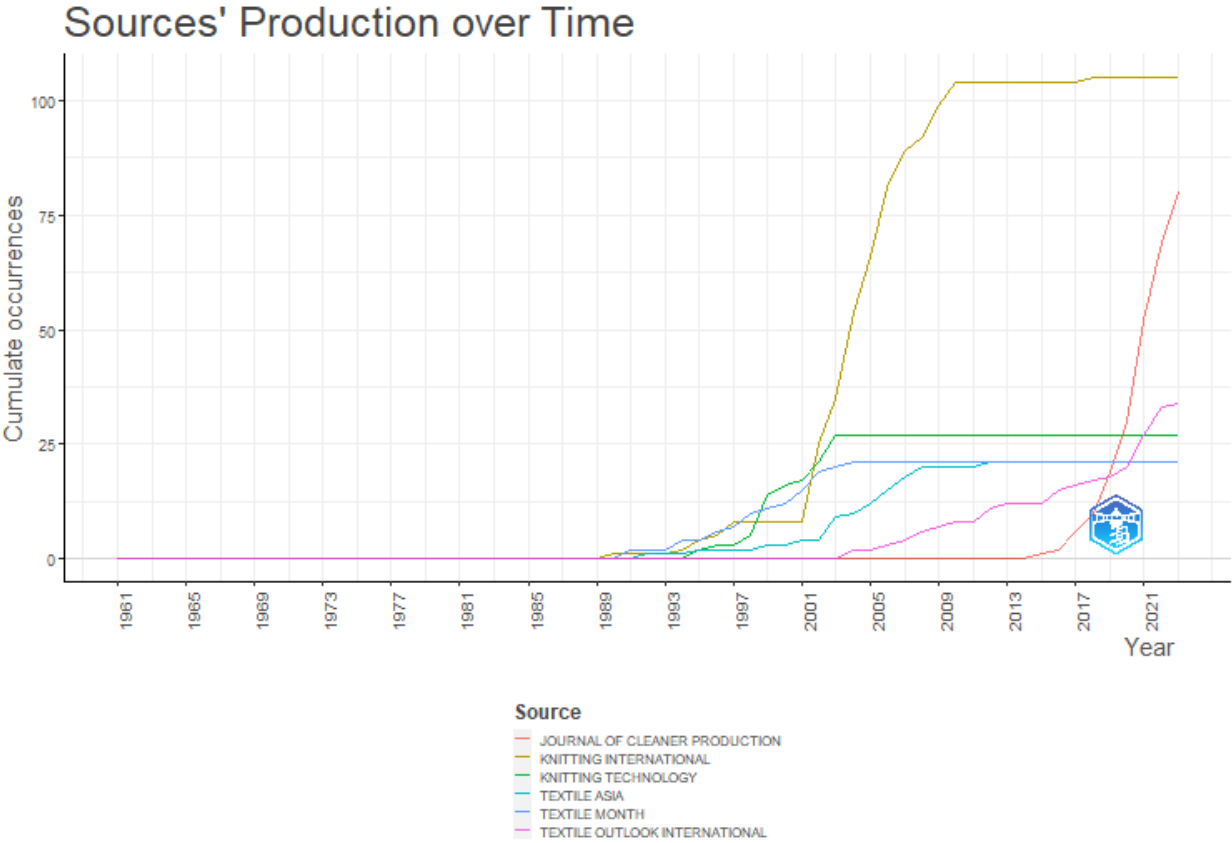


Figure 2.6: Sources' Production Over Time, Bibliometrix Tool

It can be seen in the figure that *Knitting International* exceeded 100 documents per year since 2010. Academic literature, lagging initially, caught up quickly as evidenced by *The Journal of Cleaner Production's* growth after 2015. By 2023, the dominance of industry publications emphasizes textile manufacturers' central role in driving sustainability progress. But rising academic contribution adds critical context.

In general, the data shows how sustainability has evolved from a niche topic to a pressing issue that's now at the forefront of everyone's minds. The textile industry initially started exploring approaches. Now academia is also actively involved in incorporating sustainability into textile manufacturing practices. Over time sustainability has moved from being on the outskirts to becoming a focus of research and development, within the textile sector. Moving forward, it's crucial to sustain this progress and continue transforming production. Both industry innovation and academic support play roles in achieving a future where textiles are truly sustainable.

2.2.7. Sources' Local Impact

To evaluate the local impact of the source, it's essential to start by examining the trends and implications of the metrics available for each journal.

We undertake a detailed examination of the various bibliometric indices presented for each journal. The H index is a measure that takes into account both the volume of publications from a source and the frequency with which these publications are cited in subsequent scholarly works. A higher H-index suggests a notable influence of the source within the scholarly community, indicating that its publications have been widely cited and are considered significant in their respective fields.

The G index complements the H index by providing a refined measure of a journal's scientific influence. It highlights the depth and extent of impact that articles from the journal have achieved.

Turning to the M index, this metric refines the H index further by accounting for the temporal aspect of the publications. Essentially it provides a rate of impact per year. It is a measure of the enduring relevance and influence of the journal's contributions over time.

We also take into account total citations, the total number of articles published by the source and the year when the source began publishing articles related to the circular economy in the fashion industry, in our analysis.

As illustrated in the scatter plot, considering trends such as whether the H index has been growing over time would suggest increasing influence and recognition of the source's work in the field.

The *Journal of Cleaner Production*, with an H index of 31, demonstrates a prominent influence in the field, manifesting a considerable number of citations (3925) since its entry into the subject area in 2015. This indicates a consistent level of high-quality research output that has been frequently referenced by peers, suggesting a strong resonance within the academic community.

In contrast, *Knitting International*, despite its extensive history dating back to 1990 and a substantial volume of publications (105), has a relatively modest H index of 3. This suggests that its publications, while numerous, have not significantly shaped the academic discourse on the circular economy in fashion to the same degree as some of its contemporaries.

The Business Strategy and the *Environment journal*, which commenced in 2018, has quickly established a commendable H index of 9. This rapid accumulation of academic recognition may be indicative of the journal's acute focus on the burgeoning intersection of business strategy and environmental considerations, a topic of heightened relevance in recent times.

The M index offers insight into the rate at which research is referenced post-publication. The *Autex Research Journal*, active since 2005, has a lower M index (0.263), indicating a steady yet slower pace of influence accrual over time compared to other sources.

Additionally, journals with a longstanding presence, such as *Fibres and Textiles in Eastern Europe* and *Chemical Fibers International*, have H indices that are comparable to newer publications. This observation may reflect the dynamic nature of the field, where newer research can quickly become central to the ongoing academic conversation, potentially overshadowing earlier work.

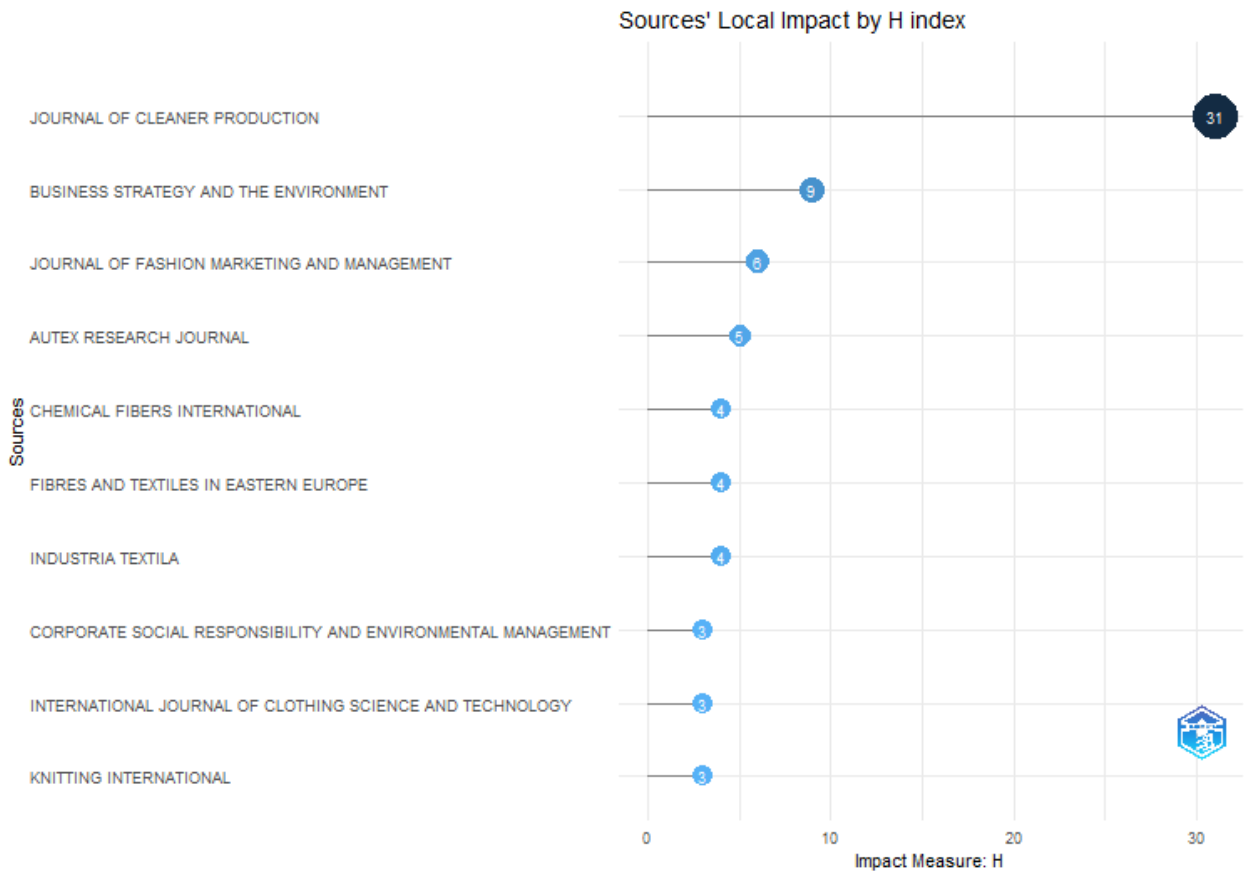


Figure 2.7: Sources' Local Impact by H Index, Bibliometrix Tool

Out of this analysis, what becomes evident is the preeminence of certain publications, such as the *Journal of Cleaner Production*, which underscores the point that influence within academic circles is often concentrated around journals that have not only a high quantity but also a high quality of research outputs.

Furthermore, the rise of publications such as *Business Strategy and the Environment* demonstrates how being open to emerging trends can place journals at the forefront of discussions even among well-established competitors. This clearly shows that the field is responsive to research that addresses concerns.

Also, the modest H indices of prolific journals like *Knitting International* suggest that the number of publications alone does not necessarily translate to influence. It's the quality of research and its relevance to contemporary discussions that drive citations and impact.

2.2.8. Most Relevant Affiliations

The most relevant affiliations associated with the publications in this dataset are concentrated among a few leading institutions although having over 300 affiliations reveals contributions from a truly global range of institutions spanning academia, industry research centers, NGOs, and more. This diversity of participating organizations highlights the interdisciplinary nature of research needed to enable a circular fashion system. Certain universities have emerged as prolific hubs of research activity. Jiangnan University tops the list with 15 articles, followed closely by Gheorghe Asachi Technical University of Iasi and Kaunas University of Technology with 13 articles each. Overall, the top 10 most relevant affiliations account for nearly a quarter of all articles in the dataset.

It's interesting to observe how universities from around the world are engaged in this topic indicating its appeal. However, there seems to be a focus on Asian institutions, which likely reflects the emphasis on sustainability and textile manufacturing in those regions. The prominent participation of universities such, as Jiangnan and the Guangdong University of Technology showcases China's leadership in this research field.

The University of São Paulo in Brazil is the only South American university in the top tier, underlining its position as a research leader in that continent.

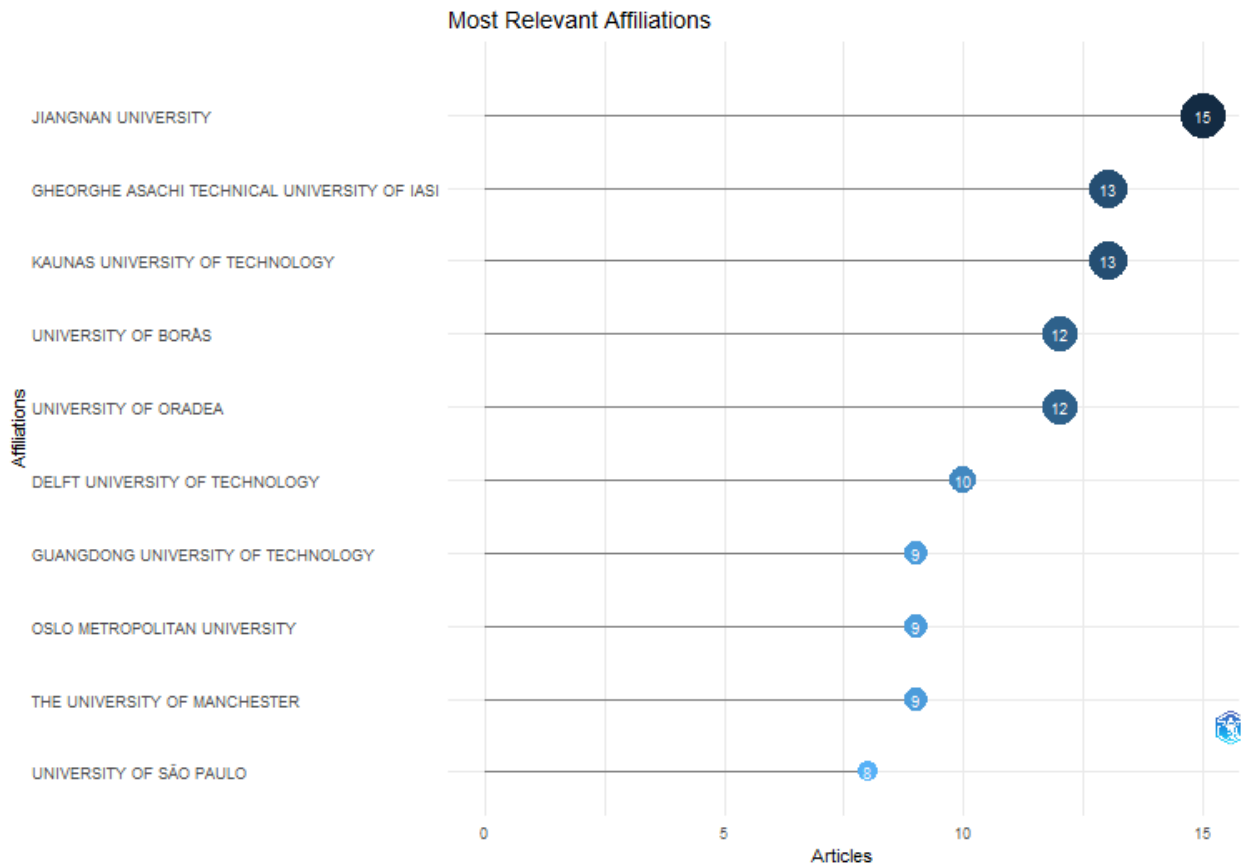


Figure 2.8: Most Relevant Affiliations, Bibliometrix Tool

While the most relevant affiliations are dominated by universities, a few research institutes and national agencies like the National Research and Development Institute for Textiles and Leather in Romania also make appearances. This indicates that both academic and non-academic research bodies are actively contributing to literature. Commercial research hubs like VTT Technical Research Centre of Finland and RISE Research Institutes of Sweden enable direct partnerships with manufacturers on circularity challenges. NGOs like the Stockholm Environment Institute also contribute unique perspectives.

Overall, the geographic and institutional distribution of the most productive affiliations highlights key regional hubs and individual organizations driving research in this field. The concentration among the top affiliations reveals that while authorship is global, it is not evenly distributed. These leading universities and institutes are clearly making an outsized contribution to the knowledge base.

2.2.9. Corresponding Author's Countries

Taking the analysis to the country level, the given dataset appears to represent the distribution of corresponding authors from various countries who have contributed to the research on the circular economy in the fashion industry.

A total of 802 documents related to the circular economy in the fashion industry have been considered. The primary metrics provided are the total number of documents from a particular country, the number of single-country publications (SCP), multiple-country publications (MCP), and their respective percentages.

The top country on the list is the United Kingdom, which has a total of 27 documents. Out of those 16 were single-country publications involving only UK authors. The remaining 11 were works with international partners. This means that 41% of the UK's output demonstrates cooperation across borders.

Following behind, Italy contributed 19 documents. India and Romania produced a total of 16 Following behind Italy.

Italy's collaboration rate stands at 26% with one-fourth of its publications involving authors from different countries. On the other hand, India's collaboration rate was significantly lower at 13%.

Aside from the leading countries, Countries like Hong Kong, Switzerland, Bangladesh, Bulgaria, Chile, Estonia, Guinea, New Zealand, Qatar, and Ukraine were at 100% collaboration, meaning all their work involved partnerships abroad.

On the other hand, the Netherlands, USA, and Belgium exhibit a balanced collaboration approach, with SCP and MCP numbers being relatively close.

Hungary, Portugal, Slovenia, Czech Republic, Greece, Indonesia, Iran, South Africa, and Sri Lanka show no MCPs, indicating that their research contributions are independent.

Overall, the dataset provides a comprehensive view of the global contributions to research on the circular economy in the fashion industry. the UK, Italy, and India emerged as leaders in the volume of publications. However, the diversity of countries involved shows this topic has global relevance.

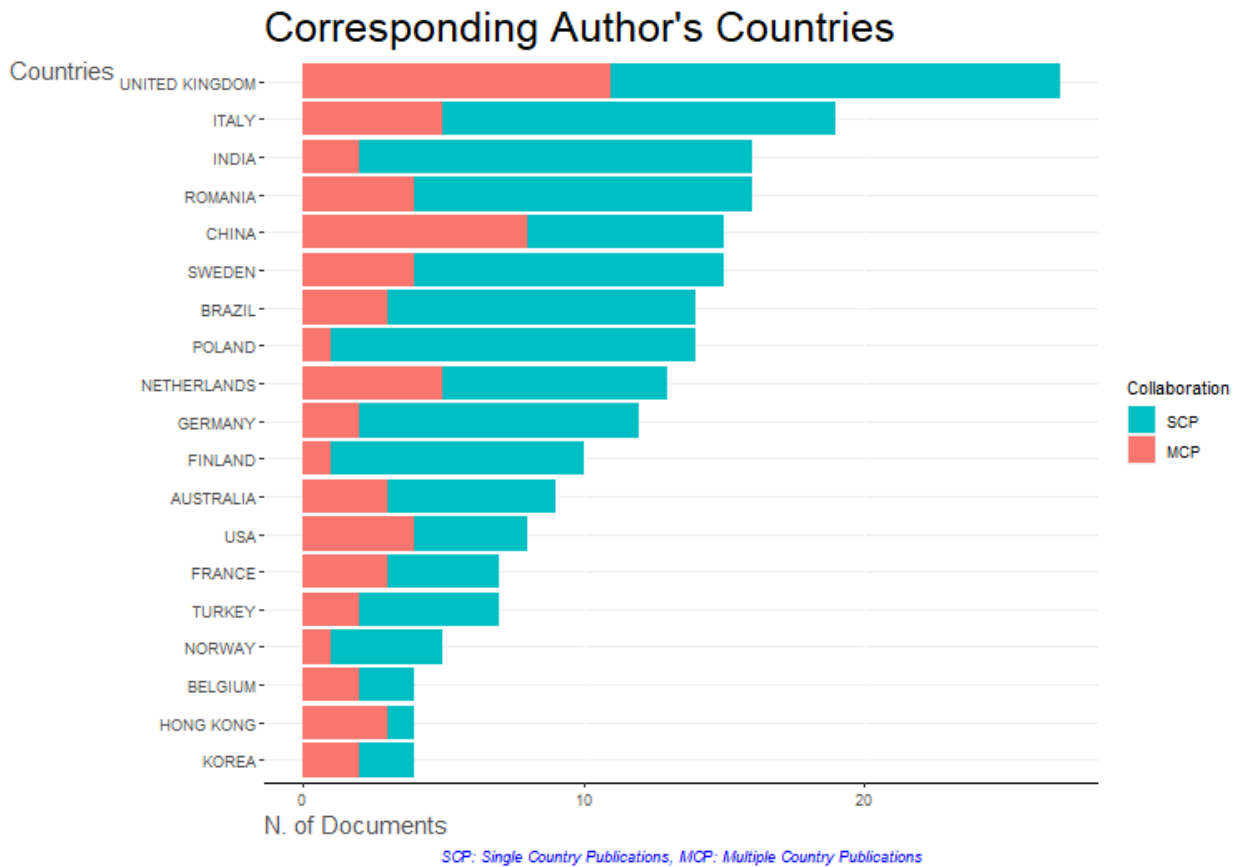


Figure 2.9: Corresponding Author's Countries, Bibliometrix Tool

2.2.10. Countries' Scientific Production

About the country's scientific production, the data reveals a concentration of output among just a handful of national research leaders.

India and the UK top the list with 104 and 102 publications each, highlighting the importance these countries place on circular fashion. In India's case, this aligns with their fashion industry and the need to address waste and sustainability concerns. The UK has a fashion heritage. It appears dedicated to transforming the industry through circularity.

Other European countries such as China, Italy, Romania, and Germany also rank high on the list with 82, 77, 74, and 62 documents.

The USA, tied with Germany at 62 documents, signifies North America's contributions to the discourse. Brazil's strong showing with 72 documents spotlights South America's growing focus on sustainability.

Countries like Sweden, Finland, and Norway having 44,40, and 19 contributions, reflect the Nordic region's longstanding commitment to sustainable practices and their translation into the fashion domain.

Countries such as Bangladesh with 10 documents, known for its textile industry, and Iran with 9, demonstrate the global scope of research in this area. The presence of diverse nations underscores the universal relevance and applicability of circular economies in fashion.

The analysis reveals a concentrated yet internationally diverse engagement in circular fashion research, with notable contributions from India and the UK. This diversity signifies a broad acknowledgment of the importance of circular economy practices across the fashion industry, reflecting a collective global effort toward circularity.

2.2.11. Most Cited Countries

Regarding citations, Knowing the citation data for different countries allows assessment of the scientific impact, productivity, and quality of different countries. This supports better policymaking, strategic partnerships, goal setting, and understanding of the global knowledge landscape.

As such, in our research topic on this aspect, Sweden, Italy, and Brazil have the highest number of citations which indicates that these countries produce many papers cited by many papers. Despite this, their per-article citation averages are only modest. To that effect, although productive, not all publications have great impacts.

Nonetheless, the UK and the Netherlands possess a lower number of total citations for each article is very high. Therefore, they tend to publish fewer numbers of papers and each paper tends to have higher significance on average. This clearly shows that there is a concentration on quality rather than quantity.

It becomes reasonable as China and India are big countries that publish many papers. However, their per-article citation rates are lower showing scope for improved production of genuinely impactful research.

These small countries like Denmark, Finland, and Norway have high total citations as well as average numbers for articles. Small in size, yet with a significant impact on science.

The US has a very high total citation count, though a low average per article, indicating a massive volume of publications across fields, of which only a small fraction are highly influential.

It is interesting to mention that countries like Iran, Estonia, and Qatar, even though they have low total citations, maintain a balanced average, indicating that the few articles they produce are well-known and frequently cited.

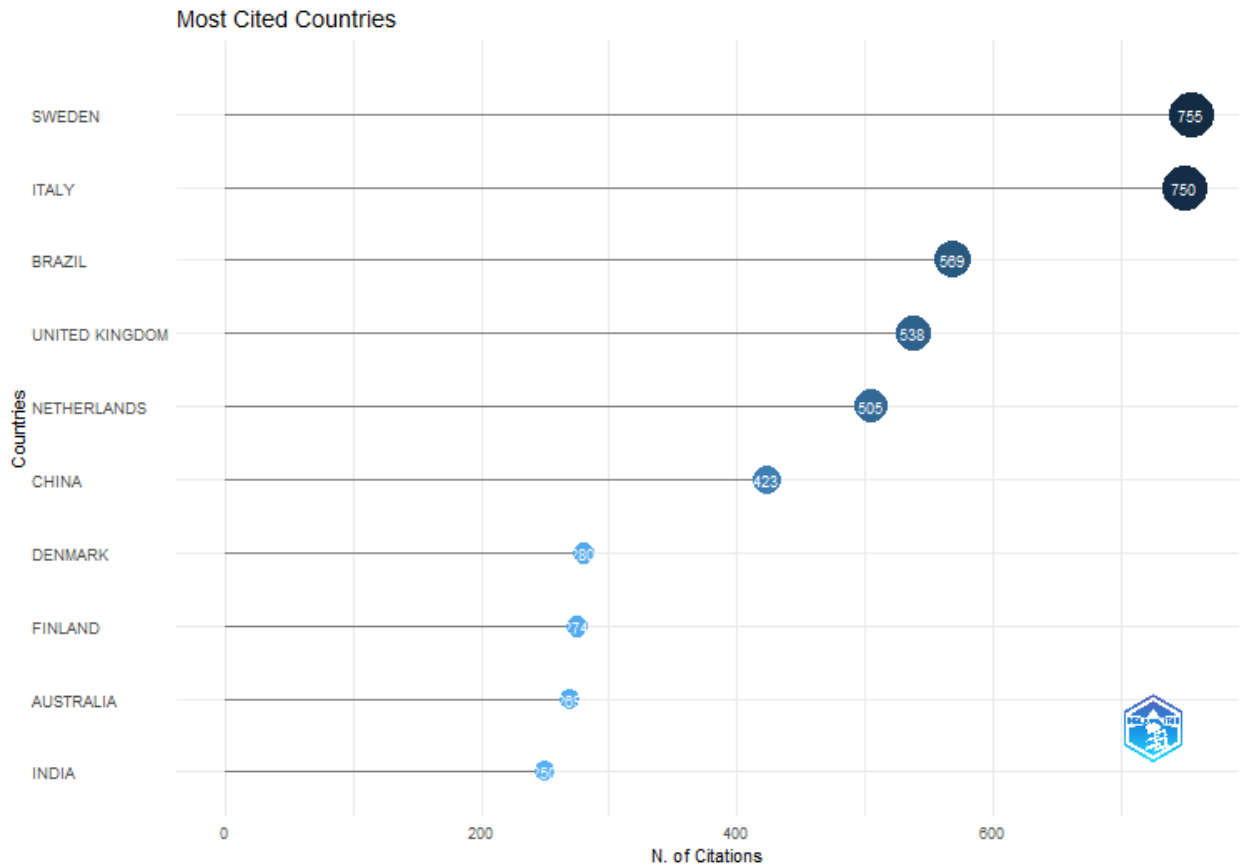


Figure 2.10: Most Cited Countries, Bibliometrix Tool

While total citations provide an overview of a country's contribution, average citations give us insight into the influence and acceptance of the research. Both are vital metrics in understanding the global landscape of circular economy research in the fashion industry.

2.2.12. Most Globally Cited Documents

We looked at where publications came from, and who wrote them, and analyzed them based on countries and time periods in previous parts. Now, it's time to take a closer look at the actual documents and papers.

The documents are distributed on a scale ranging from less than 100 to a little over 400 global citations.

The range of publication years spans from 2015 to 2020, indicating a recent surge of interest and research in the subject of the circular economy in the fashion industry. For instance, some recent papers have achieved remarkably high citation impact very quickly, like Jia et al. (2020) gaining 216 citations in just 2 years. This rapid uptake signifies the relevance and urgency of the topic.

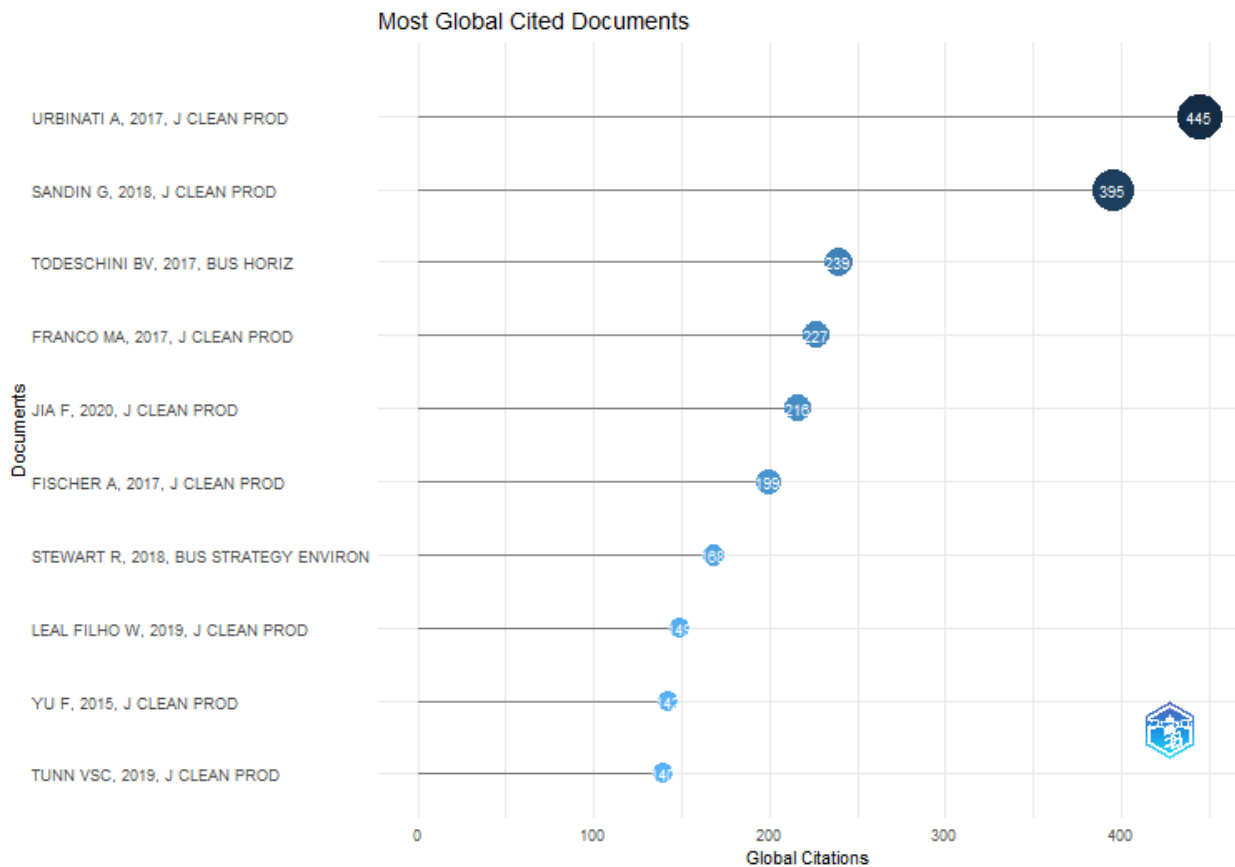


Figure 2.11, Most Global Cited Documents, Bibliometrix Tool

The top-cited paper by Urbinati et al. (2017) has 445 citations, and proposes a taxonomy of Circular Economy Business Models based on the degree of adoption of circularity along two major dimensions, the customer value proposition and interface, and the value network (Urbinati et al., 2017).

Meanwhile, Sandin & Peters (2018) with 395 citations try to expose scenarios under which reuse, and recycling are not beneficial for certain environmental impacts (Sandin & Peters, 2018).

2.2.13. Most Frequent Words

The list of most frequent words provides insight into the key topics, research areas, and terminology prevalent in the textile literature analyzed. Circular Knitting and Knitting Machines have the highest occurrences, each with 121. This tells us that research related to circular knitting processes and equipment is really prominent.

Textiles are mentioned 102 times, showing their broad relevance across the analyzed articles. But the Textile Industry comes up 100 times, almost as much, underscores the emphasis on industrial applications of textiles.

Another noteworthy theme that emerges is the Circular Economy appearing 71 times, highlighting the shift towards sustainability and circularity approaches in this industry now.

However, having company information with 64 occurrences before sustainable development with 61 indicates the potential focus on specific companies, their practices, innovations, or contributions to the textile industry. Considering also the presence of the term market, it can be concluded that there is a combination of both technical and business aspects in the industry.

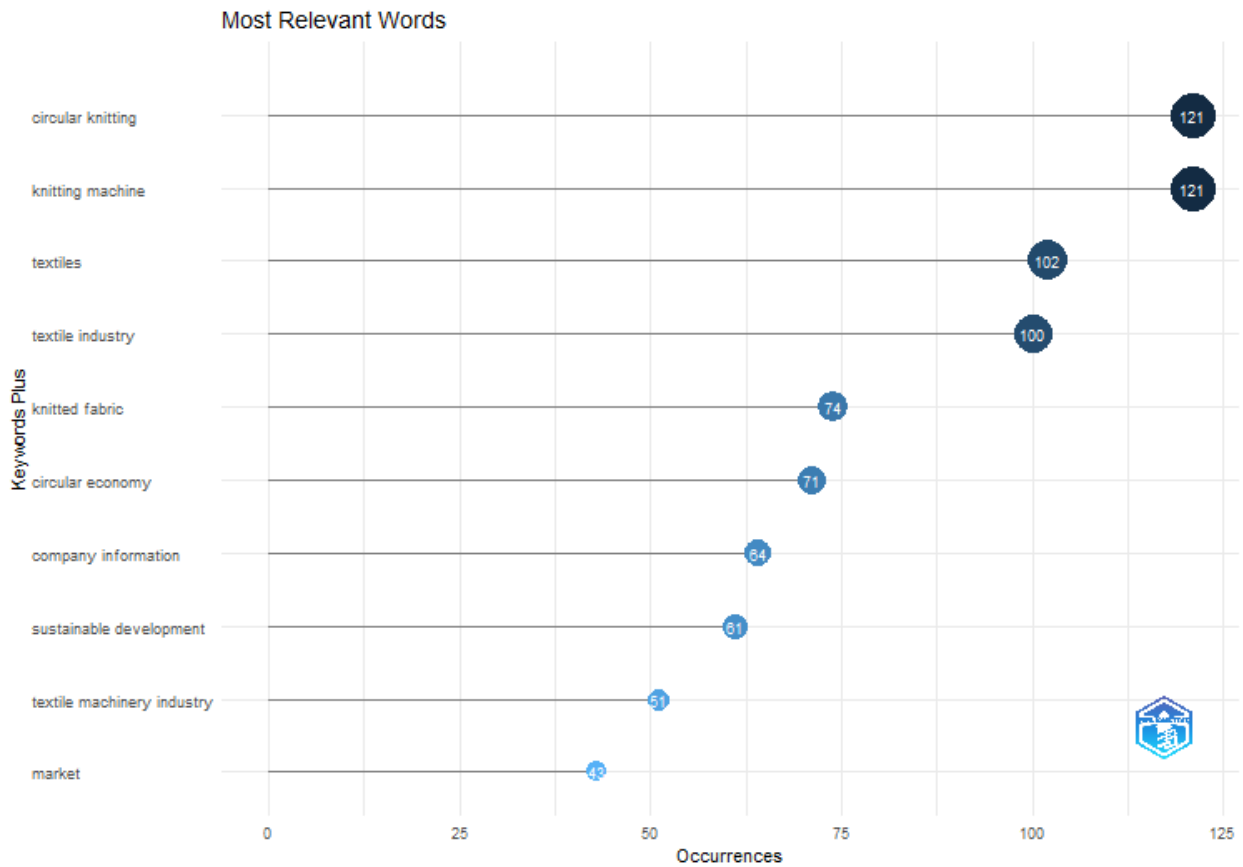


Figure 2.12: Most Relevant Words, Bibliometrix Tool

The prevalence of terms such as fabric, fiber, yarn, and knitting indicates that research in manufacturing processes, equipment, and materials continues to be important. Improving production technologies remains a priority.

Furthermore, there is an increasing emphasis on sustainability-related terms like circular economy, recycling, and waste management. They are appearing more often. This shows that assessing and reducing environmental impacts has become a significant area of research.

In addition, there is an interest in the business aspects of textiles as indicated by words such as market, supply chain, and company. The commercial and economic aspects of the industry remain crucial.

The frequent mention of terms like automation emphasizes the focus on leveraging technologies such as digitalization and automation to revolutionize manufacturing.

The wide array of niche vocabulary demonstrates the multidisciplinary nature of textile research, spanning science, sustainability, business, and engineering domains.



Figure 2.13: Most Relevant Words, Bibliometrix Tool

Overall, diverse concepts are interacting and progressing, from core engineering topics to new sustainability issues and advanced applications. The word frequencies provide a fascinating snapshot of where textile research is expanding today.

2.2.14. Words' Frequency Over Time

Analyzing the frequency of words over time is important because it gives us valuable insights about emerging trends, that help us to identify which concepts are gaining traction and at what pace.

Between 1983 and 1999, "circular knitting" and "knitting machine" increased, especially in the last decade. This growing interest in and adoption of knitting equipment and processes is apparent.

Meanwhile, "textiles" and "textile industry" were already widespread by the 1990s, moderately rising since. The sector's significance and development are reflected.

Through the early 2000s, knitting and textiles terms continued increasing, though the "circular economy" had yet to emerge. The concept was not mainstream in fashion literature.

The frequency of knitting-related terms continued to grow from 2006 to 2010 but there was still no mention of circular economy. It implies that the concept was not yet integrated into the mainstream discussion within the fashion industry's literature.

Finally, the niche terms circular economy and sustainable development proliferated dramatically after 2015, pointing to a focus on sustainability and circular business practices in the textile industry. This wave aligns with accelerated growth for circular knitting and knitted fabrics, implying a connection between circular knitting capabilities and environmental priorities.

"Company information" and "textile machinery industry" arose in the 1990s but remained relatively stable. A steady interest in textile companies and machinery is suggested.

Since 2016, "circular economy" and "sustainable development" rapidly increased, especially the former. This illustrates the strong shift towards sustainability in fashion literature.

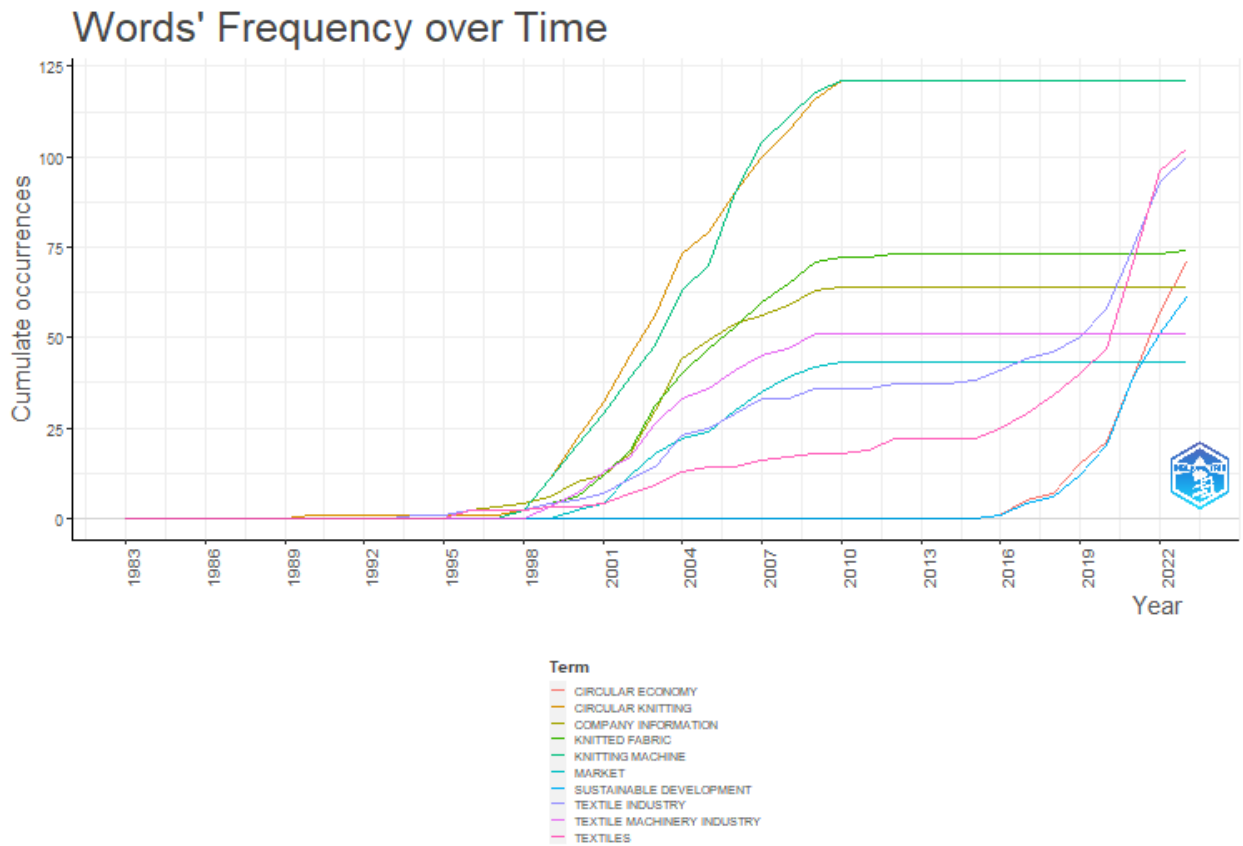


Figure 2.14: Word's Frequency over Time, Bibliometrix Tool

The overarching takeaway from word patterns is the clear swing toward sustainability in fashion research. "Circular economy" and similar concepts have increasingly popped up in recent years. The data signals a pivot in the industry's priorities as it reacts to the increasing cries for greener practices. This suggests sustainability concerns will color both present and future research within the field. While the frequency trends don't necessarily prove a causal relationship, it would be short-sighted to ignore the implied connection. The writing is on the wall that environmental factors now weigh heavily on the fashion industry's mind. Moving forward, the tide has turned towards responsible innovation and design thinking. The numbers don't lie - sustainability is capturing fashion's imagination. All signs point to this mindset shift permeating the industry's academic pursuits.

2.2.15. Trend Topics

Examining the frequency of words throughout the years offers insight into the changing priorities and areas of emphasis within the textile industry. This allows us to catch a glimpse into different eras that reveal how the industry has progressed.

In the stages from 1996 to the 2000s, there was a notable concentration on manufacturing machinery, including “knitting machines, circular”, “knitting, circular”, and “textile, machines”.

We can see a rise in technological integration from 2000 to 2007. There was a noticeable shift towards incorporating technology in textile production in the 2000s. Terms like computer control and industrial textile imply a focus on integrating industrial and IT processes into textiles. This also includes medical textiles, indicating an expansion into specialized textile applications.

As we move towards the 2010s, and especially into the 2020s, there is a clear shift in focus towards circular economy. The textile industry sees a revival as a priority area starting after 2016, with steeply rising frequency through 2021. This aligns closely with the swelling emphasis on circular economy and sustainability concepts in the late 2010s, culminating recently between 2020-2022. The alignment in timing suggests that sustainability is a major factor influencing renewed interest in the textile sector.

Core manufacturing building blocks in yarn, weaving, and knitting have maintained recurring consideration over the decades. However, yarn singularly experienced major renewed interest as of 2021, indicative of circular reconfiguration taking shape at the yarn production level.

Commercial sales and business facets of the industry also rebounded markedly over 2010-2021, likely reflecting digital and e-commerce evolution.

On equipment, while textile machinery and computerized control appeared in the early 2000s, attention in this specific realm seems to have evened out in later years as technologies matured.

Finally, the methodology and case study mention accelerating rapidly after 2020, suggesting circular principles translating into practical implementation and experimentation attempts inside fashion enterprises.

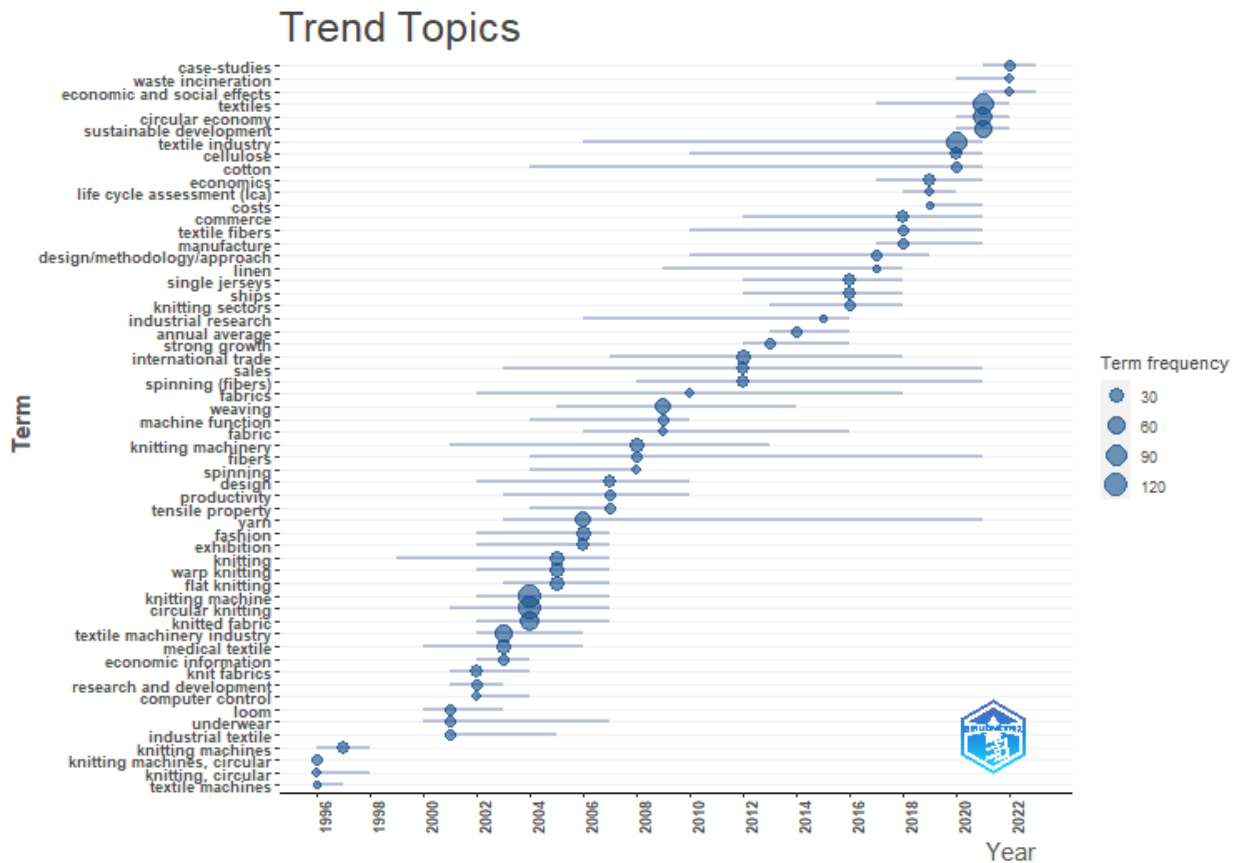


Figure 2.15: Trend Topics, Bibliometrix Tool

Taken together holistically, the quantitative temporal representations strongly point towards an overarching transition from a primary focus on technological innovation to that of implementation of sustainability principles as the currently dominant concern, resulting in the integrated perspective defined by environmental and social accountability observed today.

2.2.16. Thematic map

The thematic map offers a visual representation of key research themes derived from academic papers on the circular economy within the fashion industry. Themes are plotted based on two dimensions: the vertical axis representing the development degree (or density) of the research on that theme, and the horizontal axis indicating the relevance degree (or centrality) to the field.

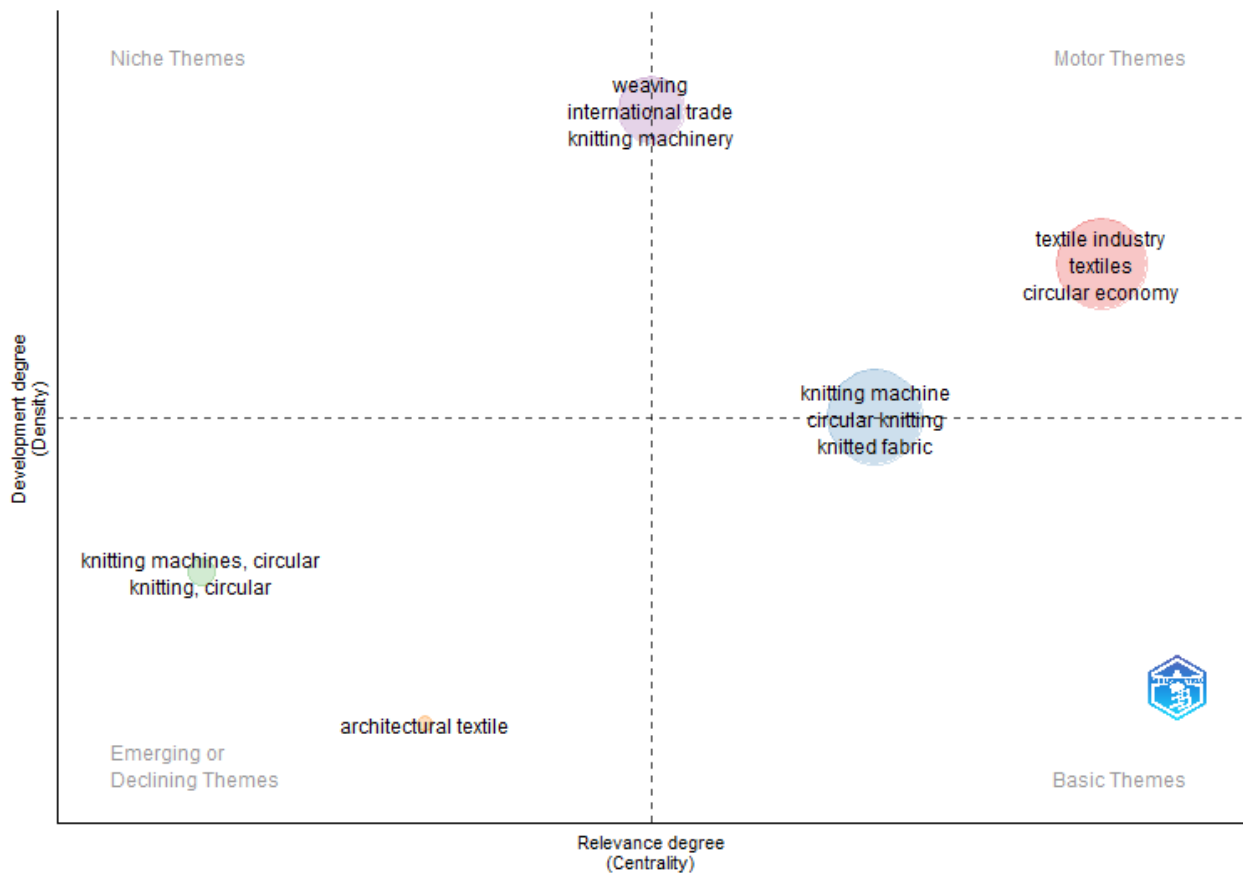


Figure 2.16: Thematic Map, Bibliometrix Tool

In the upper-right quadrant, labeled "Motor Themes," we find themes like 'textile industry,' 'textiles,' and 'circular economy,' which are central and well-developed in the literature, indicating they are mature and foundational topics within the field. Their positioning suggests that they are widely discussed and considered crucial for understanding the broader discourse of circular economy practices in fashion. Conversely, in the lower-left quadrant, "Emerging or Declining Themes," there is 'architectural textile,' which may represent a niche or a diminishing area of focus, implying that while it may be of growing interest, it has not yet achieved prominence in the literature or may be phasing out of current scholarly discussions.

In contrast, the "Niche Themes" in the upper-left quadrant like 'weaving,' 'international trade,' and 'knitting machinery' show a high development degree but lower centrality. This suggests that while significant research has been conducted in these areas, they are not as central to the core discussions of circular economy in fashion. Lastly, themes in the "Basic Themes" quadrant such as

'knitting machine,' 'circular knitting,' and 'knitted fabric' are shown to be of high centrality but with less density, indicating they are essential for the field's discourse but may require further development in literature to provide a more robust body of knowledge. This thematic map is a strategic tool for identifying which areas of research are saturated and which require further scholarly attention, potentially guiding future research directions.

2.2.17. Co-occurrence Network

The co-occurrence network provides a comprehensive view of how different concepts and themes are interconnected. The visualization presents clusters of related terms. Larger nodes indicate terms with higher occurrences or importance in the documents. The thickness of the lines between nodes reflects the strength of the co-occurrence relationship.

Cluster 1, which is represented in the color red, is dominated by terms related to the core concepts of the circular economy, sustainable practices, and their application in the textile industry. On the other hand, the second group, which is shown in blue, primarily concentrates on the industry's elements, like machinery and the knitting process.

The betweenness centrality score indicates how frequently a node is present, on the paths connecting other nodes. Nodes with higher betweenness are often seen as influential since they bridge different paths on the network. With this in mind, the textile industry has the highest betweenness centrality, suggesting that it is a critical bridge in the literature, connecting various concepts of the circular economy in the fashion industry.

Knitting machines and circular knitting have high scores as well, suggesting that they play a role, in connecting various research areas within the technical aspects of the industry.

When considering the closeness centrality score it indicates how closely connected a node is to all nodes in the network. A higher closeness score suggests that a node can efficiently distribute information throughout the network.

The textile industry, knitting machine, and circular knitting have higher closeness scores, indicating their proximity to nodes and their potential to disseminate information more effectively compared to other terms. The higher closeness in the textile industry highlights its central position in fashion-related circular economy studies.

Another important metric is PageRank, which reflects the likelihood of reaching a node through a random walk within the network. It indicates the node's influence in the network.

Knitting machine, circular knitting, and textile industry have the highest PageRank scores, suggesting that these nodes are very influential within the network. It implies that these terms are not only frequently occurring but are also crucial in connecting different aspects of the circular economy in fashion.

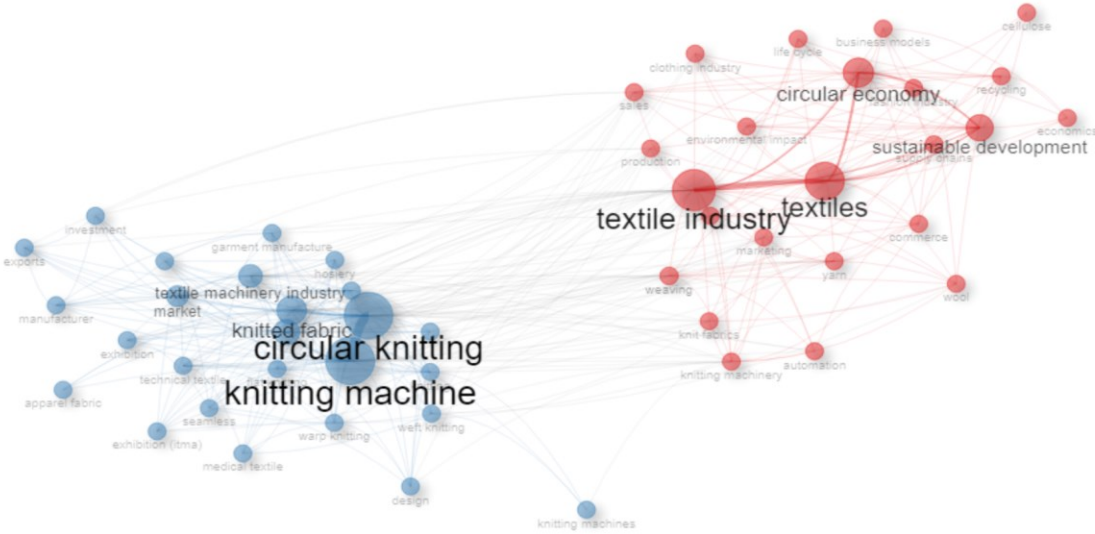


Figure 2.17: Co-occurrence Network, Bibliometrix Tool

Looking at all these scores and information, we can interpret that the textile industry is central to the discussion, acting as a hub for the circular economy in fashion. It is connected to sustainability, economic aspects, and the technical process.

Technical terms such as circular knitting and knitting machine are central within their cluster, which might reflect a focus on innovation and technology in achieving sustainability in the industry.

Terms like sustainable development and circular economy have lower betweenness than textile industry, but they still hold significant importance in the thematic content of the documents.

Nodes like cellulose and economics have zero betweenness, which could indicate that they are niche areas within the research that are not widely interconnected with other topics.

2.2.18. Co-citation Network

Co-citation network provides insights into the intellectual foundation and influential works underpinning research on circular economy in the fashion industry. It helps us to identify core literature and important works within a specific field of study. Examining which papers are frequently co-cited in this domain reveals the foundational theories, knowledge flows and thematic evolution shaping this nascent interdisciplinary research area. Co-citation networks can also show us the structure of the scientific field by showing clusters of research that represent sub-fields or thematic areas within the larger perspective.

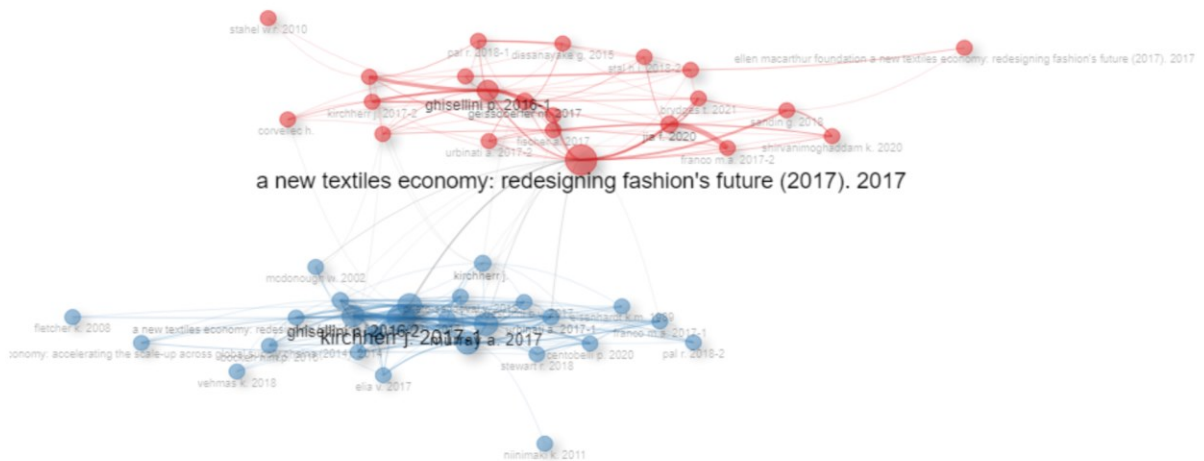


Figure 2.18: Co-citation Network, Bibliometrix Tool

In this visualization, we can observe different components. Each node in the network corresponds to a piece of scholarly work. it could be an article from a journal, a conference paper, a book, or any other publication. The bigger the nodes, the more attention it's gotten in terms of citations, showing how impactful or important it is in its field.

The lines connecting the nodes represent co-citations. It means if two works are connected by a line, they have been cited together in one or more publications. The thickness of the lines might indicate the frequency of co-citations. So, the thicker lines show more common co-citations.

In our particular network, there are two distinct colors used to represent two different clusters. These clusters may indicate subtopics or other related research areas in this field. We can see the publications that are more frequently cited together are grouped in the same color.

Beginning with the nodes, "A new textiles economy: Redesigning fashion's future (2017)" is a report published by the Ellen MacArthur Foundation in 2017. This report advocates a shift away from the current wasteful linear textiles system to a circular model that maximizes resource value and minimizes environmental harm. It proposes a vision aligned with circular economy principles. a model that clothes, fabric, and fibers re-enter the economy after use and never end up as waste. (Ellen MacArthur Foundation, 2017). This report appears as a central node in Cluster 1 with the highest betweenness centrality score of 527.63, indicating that it is a pivotal work in the network through which a lot of citation traffic passes.

The betweenness score for a node tells us how often that node serves as a bridge between two other nodes. In the second cluster, Kirchherr j. (Kirchherr et al., 2017) has a betweenness centrality of 283.47. indicating that it plays a role in connecting different research areas or subdomains.

Considering the clusters in context, we can observe two groups within the network. The first cluster, depicted in red appears to be centered around publications and emerging trends as it includes nodes, from 2015. On the other hand, cluster 2 contains publications that potentially represent theories and frameworks.

The presence of multiple publications from the same authors in different clusters suggests these authors made significant contributions to different aspects of the circular economy in fashion industry research.

The high betweenness scores of recent publications in cluster 1 indicate that the field is actively developing with new research building on previous works.

Taking into account the PageRank, it represents the possibility of arriving at a particular node through random walks. It highlights the influence of certain works over others. For example,

"A new textiles economy: Redesigning fashion's future (2017)" has a high PageRank in cluster 1, highlighting its importance in the current discussion.

In summary, this bibliometric analysis utilizing Bibliometrix provides a comprehensive overview of the evolution and current state of research on the circular economy in the fashion industry. The extensive dataset, which includes publications from 1961 to 2023, highlights a significant increase in scholarly activity, particularly reflecting the heightened global awareness of sustainable practices within the fashion industry over recent years. With an average of 8.61 citations per document and a total of 16,115 references, the analysis underscores the field's academic impact and its complex web of knowledge.

The thematic map, a pivotal component of this analysis, categorizes research themes into four quadrants, revealing the maturity and centrality of topics such as the textile industry, textiles, and circular economy, which are extensively developed and fundamental to the discourse. Conversely, niche, and emerging themes such as architectural textiles, while less central, indicate areas that could be ripe for exploration or are in the process of declining in scholarly relevance.

The industry's elements, particularly those related to machinery and knitting processes, stand out as integral to the operational side of circularity in fashion, pointing towards a strong link between technical advancements and the implementation of sustainable practices. The thematic clusters within the bibliometric network map highlight the interplay between core circular economy concepts and the practical aspects of the fashion industry's transition toward sustainability.

Through this analysis, it is evident that the field is not only active but also evolving, with new research building on foundational studies. The growing number of publications and their citation impact demonstrate the establishment of circular economy practices in the fashion industry as a prominent area of research. Furthermore, the analysis suggests a shift in focus towards sustainability and circular business models, which may influence the direction of future research and industry innovation.

In conclusion, the bibliometric analysis paints a picture of a dynamic and expanding field, with a clear trajectory from a focus on technological innovation towards integrating sustainability principles. The diverse range of themes and their development over time reflect the industry's multifaceted approach to embracing circularity, highlighting the crucial role of research in shaping a more sustainable future for fashion.

3. Content analysis

In advancing the comprehensive review of circular economy practices within the fashion industry, the scope of our content analysis has been judiciously selected to cover the period from 2019 to 2022. This decision was informed by the existence of a prior systematic literature review, “The Circular Economy in the Textile and Apparel Industry: A Systematic Literature Review” (Jia et al., 2020), that thoroughly examined studies up until 2019. We aim to build upon this existing foundation, extending the knowledge frontier by examining the content and conducting a thematic analysis of the most recent papers.

Through meticulous examination of the literature during this period, we delve into the latest research, evaluating advancements, and identifying emerging trends that have surfaced post-2019. This analysis serves to update the academic and industry communities on the current state of the art. By integrating the insights gleaned from this content analysis with the broader strokes painted by the bibliometric analysis, we endeavor to provide a nuanced and up-to-date synthesis of the field, fostering a deeper understanding of the current landscape and trajectory of circular economy research within the fashion sector.

3.1. Methodology

3.1.1. Systematic literature review

To provide a thorough presentation of the current state of the scholarly discussion in circular economy in the fashion industry, we performed a systematic literature review. A literature review is a summary and evaluation of the existing research on a particular topic. It provides an overview of what has been studied before, identifies gaps or inconsistencies in the literature, and sets the stage for new research (Cronin et al., 2008).

A narrative literature review is not driven by a protocol. The researcher identifies relevant studies on the topic and summarizes the key findings, arguments, theories, etc (Jesson et al., 2017). There is often less focus on systematically identifying all relevant literature or assessing the quality of the studies reviewed.

In contrast, a systematic literature review uses a more rigorous, structured approach to reviewing literature. The goal is to comprehensively identify and evaluate all studies that meet pre-determined eligibility criteria related to the research question (Gough et al., 2012).

3.1.2. PRISMA Framework

For the data collection step, we used the PRISMA framework. The PRISMA statement was developed by an international group of experts to help improve the reporting quality of systematic reviews and meta-analyses. PRISMA consists of a 27-item checklist and a 4-phase flow diagram to guide transparent reporting. The checklist covers critical information that should be reported in the title, abstract, introduction, methods, results, discussion, and funding sections. The flow diagram depicts the flow of information through the phases of a systematic review, from identification of records to screening, assessing eligibility, and final inclusion. (Moher et al., 2009)

PRISMA aims to help authors improve the reporting of systematic reviews by providing an evidence-based minimum set of reporting items. It can be used for reporting systematic reviews of interventions as well as other types of evidence syntheses. PRISMA has been widely endorsed by journals and editorial groups to encourage its adoption. An Explanation and Elaboration paper provides the rationale and examples for each checklist item. (Moher et al., 2009)

While PRISMA focuses on improving reporting, it does not assess the quality of systematic reviews. It provides a basis for assessing review reports by ensuring clear, complete, and transparent reporting. In summary, PRISMA is an important, internationally developed standard that authors should follow to ensure their choices are reported fully and transparently (Page et al., 2021).

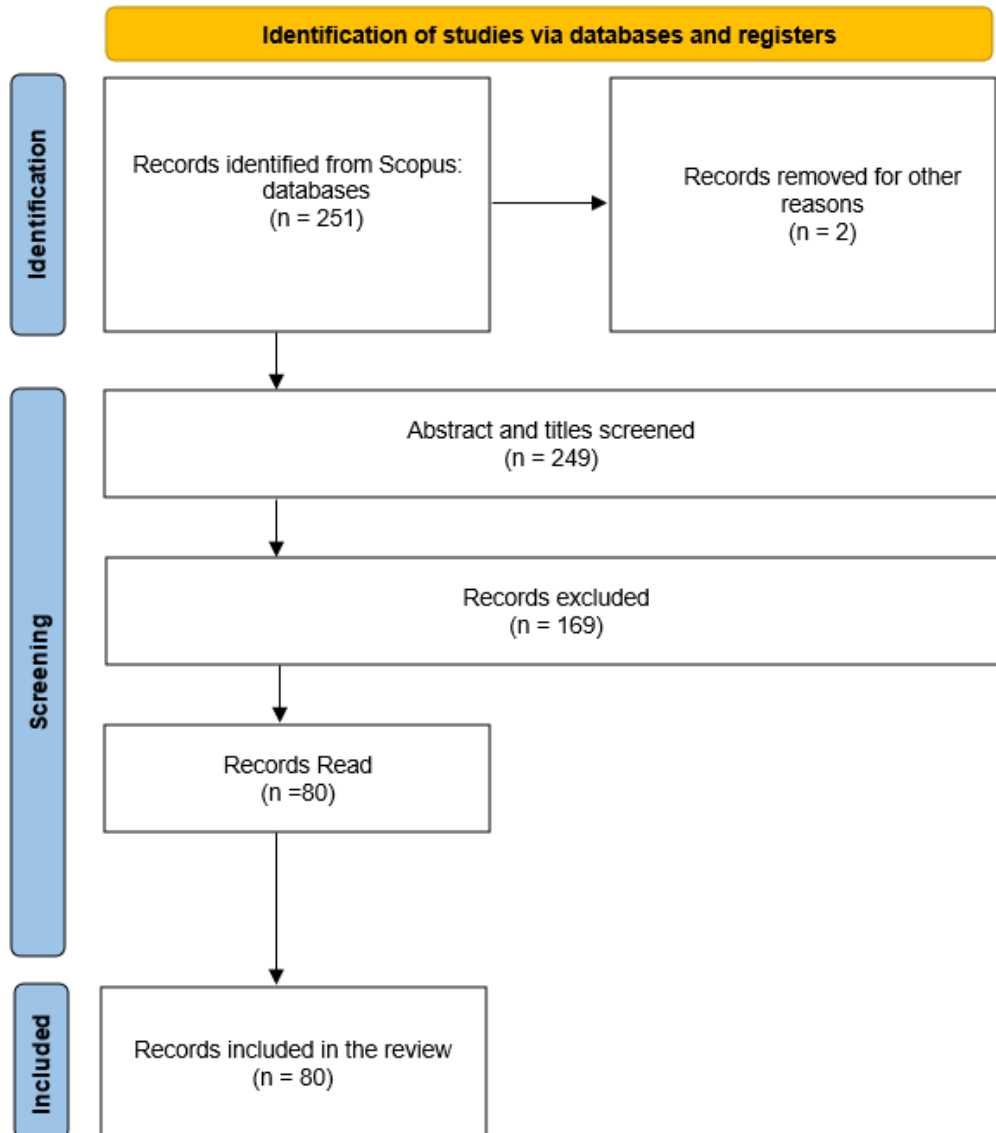


Figure 3.1: PRISMA 2020 Flow Diagram, (<http://www.prisma-statement.org/>)

We conducted a search in the Scopus Database to identify the relevant papers. The query that we chose for this part of the study consisted of the following factors:

1. We looked within the abstract, title, or keywords for a keyword related to circularity and fashion.
2. We limit to records written in English.

3. We limit records published in journals related to Business, Management, or Accounting to ensure relevance and consistency.
4. We limit papers published from 2019 to 2022 to do our review on the emerging database.

This is the query:

```
TITLE-ABS-KEY ( circular* AND ( fashion* OR cloth* OR textile* OR apparel* OR garmen* OR sartorial* ) ) AND ( LIMIT-TO ( SUBJAREA , "BUSI" ) ) AND ( LIMIT-TO ( PUBYEAR , 2019 ) OR LIMIT-TO ( PUBYEAR , 2020 ) OR LIMIT-TO ( PUBYEAR , 2021 ) OR LIMIT-TO ( PUBYEAR , 2022 ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) )
```

We screened abstracts and titles of 249 papers and decided to exclude 169 based on the relevance, quality of the paper, and quality of the journal.

In the end, we were left with 80 papers (Appendix A) to read and review for this study. The next step is to analyze them.

3.1.3. MAXQDA

We imported the included studies into the software MAXQDA 2022. MAXQDA is a software tool designed for the analysis of mixed methods data and qualitative findings in many forms such as text, video, and photo. It is commonly utilized for the purpose of elucidating and conducting theoretical research in the realm of social and cultural phenomena (Marjaei et al., 2019).

The term “qualitative data” originates from the field of social sciences and serves as a broad term including any nonnumerical and unstructured data. While the concept of numerical data is readily understood by most individuals, the comprehension of qualitative data is not as straightforward.

In our work, based on recurrent concepts and keywords that we found in bibliometric analysis plus the keywords found in the chosen 80 papers (for example, “Fashion” or “circular”), we constructed a dictionary and proceeded to a dictionary-based content analysis using an automatic coding function built into the software. This process gave us coded segments, which were vetted individually. We checked each of these parts one by one. We did this over and over, trying to make

our categories better and better, so we could understand what the main focus of research and the things that still need more research are in the fashion industry's circular economy.

3.2. Thematic Analysis

In the previous sections of our discussion, we conducted a comprehensive literature review, a carefully organized research method aimed at compiling, synthesizing, and critically analyzing the results obtained from previous studies related to our research. This methodology is particularly valued for its potential to mitigate biases that may arise from individual studies or reviews that lack a systematic framework. Through this rigorous process, we aimed to construct a comprehensive landscape of the scholarly dialogues surrounding our topic of interest, thereby laying a solid foundation for the subsequent analysis.

Delving into the thematic analysis of the literature, we unearthed three fundamental precursors that play a pivotal role in shaping circularity strategies within the fashion industry. These precursors include regulatory frameworks, idiosyncratic motives intrinsic to individual entities, and considerations related to the value chain. It became evident through our analysis that each precursor not only contributes to the emergence of circularity strategies but also influences their distinct characteristics and implementations. This diversity in origins and motivations underscores the complexity and multifaceted nature of circularity within the fashion sector, paving the way for a nuanced exploration of how these strategies manifest and evolve.

The Regulations and industry standards emerge as critical precursors in the development and implementation of circularity strategies within the fashion industry (Luoma et al., 2022). These frameworks, encompassing a range of laws, policies, and guidelines established by governments, international bodies, and industry coalitions, play a pivotal role in directing the environmental, social, and economic practices of fashion entities. They serve not only as a mechanism for ensuring compliance and enforcing sustainability measures but also as a catalyst for innovation and market competitiveness. By setting the bar for sustainable practices, these regulatory frameworks compel fashion companies to adopt circular approaches such as recycling, sustainable sourcing, and eco-friendly manufacturing, thereby aligning their operations with global sustainability goals. Understanding the influence of regulations and industry standards is paramount for fashion companies aiming to navigate the complexities of the market and the demands of a sustainability-conscious consumer base. This knowledge facilitates strategic planning, allowing companies to

anticipate regulatory trends and integrate circular principles into their business models proactively. Moreover, compliance with these standards not only mitigates legal and reputational risks but also opens up new opportunities for innovation and differentiation in the marketplace. As such, the role of regulations and industry standards as a precursor of circularity strategies underscores their importance in shaping a sustainable future for the fashion industry, making them an essential consideration for businesses committed to the circular economy paradigm.

Idiosyncratic motives represent the second precursor to the emergence of circularity strategies within the fashion industry, highlighting the role of unique, company-specific drivers that lead to the independent adoption of sustainable practices (Angel et al., n.d.). Unlike the regulatory-driven approach, where external pressures dictate the shift towards circularity, idiosyncratic motives stem from internal values, visions, and strategic decisions made by individual companies. These motives can vary widely, ranging from a genuine commitment to environmental stewardship and social responsibility to the pursuit of long-term business resilience and differentiation in a competitive market.

The influence of idiosyncratic motives on the adoption of circularity strategies is profound and multifaceted. Companies driven by these internal motives often go beyond mere compliance with regulations, innovating new business models, products, and processes that embed circular principles at their core. This can include initiatives such as designing garments for longevity, implementing take-back schemes for recycling, or adopting zero-waste production techniques. Such strategies not only contribute to environmental and social goals but also resonate with increasingly conscious consumers, enhancing brand loyalty and market positioning.

The third precursor to the emergence of circularity strategies in the fashion industry revolves around value chain considerations (Sandvik & Stubbs, 2019). This precursor highlights how independent economic actors, including firms and stakeholders at various stages of the fashion value chain—from raw material sourcing through to manufacturing, distribution, and post-consumer phases—collaboratively contribute to the development and implementation of circular practices. Unlike idiosyncratic motives, which are driven by internal company values and strategies, value chain considerations involve a coordinated effort among multiple players in the ecosystem to create a closed-loop system that minimizes waste and maximizes resource efficiency.

Value chain considerations become a precursor for circularity strategies as companies recognize the interconnectedness of their operations and the cumulative impact of their collective actions on

sustainability goals. Through collaboration, companies can address challenges that are beyond the capacity of any single entity, such as developing sustainable materials, improving product design for recyclability, and setting up efficient take-back and recycling systems. For instance, suppliers may innovate eco-friendly materials that designers then incorporate into products, while retailers could facilitate consumer participation in recycling programs. This cooperative approach ensures that circularity is embedded throughout the product lifecycle, leading to more significant environmental benefits and resource savings.

For each of the precursors, identified—regulations and industry standards, idiosyncratic motives, and value chain considerations—we have noticed the emergence of distinct categories of circularity strategies within the fashion industry. In the sections that follow, we will delve deeper into the specifics of these strategies, shedding light on the multifaceted approach the fashion industry is taking towards embracing circularity.

3.2.1. Regulations and industry standards

Regulations and industry standards are pivotal in shaping the circular economy within the fashion sector, serving as catalysts for the adoption of sustainable practices. The European Commission's new Circular Economy Action Plan highlights the need for designing sustainable products and enhancing circularity in production processes, particularly targeting the resource-intensive textiles sector (Koszewska et al., 2020). Local governance also plays a crucial role, with municipalities employing various strategies to facilitate the circular transition, such as rule enforcement and collaboration with stakeholders in textile recycling (Christensen, 2021). Furthermore, the EU Circular Economy Package mandates separate textile collections by 2025, pushing member states towards higher collection rates and addressing the challenges of processing lower-quality textile waste (Haegglom & Budde, 2020). These examples underscore the significant impact of regulatory frameworks on driving circular economy initiatives in the fashion industry. These regulatory obligations By necessitating eco-friendly practices, encourage the fashion industry to innovate and develop new, sustainable, and circular solutions.

In response to these regulatory pressures and standards, the fashion industry has seen the emergence of various strategies aimed at promoting circularity and reducing environmental footprints. Based on the source of initiation and the primary focus area, we grouped these strategies

into four clusters: European Commission, Municipal/Local Governance, Non-EU Countries or Regions, and Industry and Regulatory Standards.

3.2.1.1. European Commission

The European Commission's proactive approach towards a Circular Economy (CE) in the fashion industry is marked by significant milestones, including the adoption of the Circular Economy Action Plan in 2015, the establishment of a stakeholder platform in 2017, and a comprehensive package of initiatives in 2018 aimed at addressing plastics, chemical-product-waste interplay, critical raw materials, and progress monitoring (European Commission, 2020). The latest Circular Economy Action Plan emphasizes a sector-specific agenda, highlighting an upcoming EU Strategy for Textiles designed to enhance the sector's competitiveness and innovation, promote sustainable and circular textiles, counteract fast fashion issues, and introduce new business models. Key measures include applying a sustainable product framework to ensure textiles' circularity, fostering a conducive business and regulatory environment, mandating separate textile waste collection by 2025, and enhancing international cooperation for transparency and sustainable practices in the textile industry (Koszewska et al., 2020).

This plan offers a guiding framework for businesses to realign their operations with circular economy principles, fostering innovation in product design, material usage, and supply chain management to achieve sustainability targets and reduce environmental impacts (Ki et al., 2020).

The emergence of Extended Producer Responsibility (EPR) has prompted many textiles and apparel (T&A) enterprises to participate in the recycling chain more actively, signaling a paradigm shift towards integrating returned products to improve value cost-effectively. This approach could provide companies with a competitive advantage (Jia et al., 2020).

The discussion around Extended Producer Responsibility (EPR) for textiles and apparel, influenced by directives such as the WEEE Directive (Directive 2012/19/EU) in electronic products, represents regulatory initiatives that, while not exclusively mentioned as emerging from the European Commission, align with the type of regulations often promoted at the EU level.

The WEEE Directive in the EU imposes obligations on producers of electrical and electronic consumer products, including responsibilities for product take-back and disposal. It has led companies in the electrical and electronic sector to incorporate these requirements into their

design processes, resulting in a significant part of the sector having an impressive record of reprocessing returned products and recycling materials and components (Leal Filho et al., 2019).

Currently, France stands out as having the only functioning mandatory EPR system for textiles, though countries like Sweden and other Nordic regions are increasingly discussing EPR-related measures. This underscores the growing attention within the textile industry towards EPR as a policy approach to extend a producer's responsibility to the post-consumer stage of a product's life cycle (Kant Hvass & Pedersen, 2019).

Other strategies that have been significantly influenced by WEEE regulations, we can mention Design for Environment (DfE), Design for Disassembly (DfD), and Design for Disposal strategies. The directive emphasizes the need for electronic and electrical products to be designed with their end-of-life in mind, encouraging recycling and reducing waste. Although initially targeted toward electronic goods, the principles of this directive have inspired the fashion industry to adopt similar approaches in product design (Tyler & Han, 2019).

DfE emphasizes eco-friendly product design to minimize environmental impact. DfD focuses on designing products for easy disassembly at the end of their life cycle, facilitating recycling or component reuse. Design for Disposal involves designing products to ensure safe and efficient disposal. These strategies are integral to meeting WEEE obligations, encouraging producers to design products that are easier to recycle or dispose of, contain fewer hazardous substances, and reduce end-of-life expenditure, thereby promoting sustainability and resource efficiency (Tyler & Han, 2019).

The Horizon 2020 framework, which is the EU's largest Research and Innovation program with nearly €80 billion of funding available over 7 years (2014 to 2020), funded the Resyntex project. resyntex aims to develop chemical recycling technologies for mixed textile fibers. This project is premised on the principle of 'industrial symbiosis,' turning waste fibers into secondary raw materials for use in various industries such as construction, transport, and packaging. The goal is to identify commercialization paths for textile recycling technology, taking into account a wide range of market, financial, and stakeholder perspectives (Hall & Boiten, 2020).

Speaking about another regulation implemented by the European Union, REACH, "Regulation (EC) No 1907/2006", which is the official document for the Registration, Evaluation,

Authorisation, and Restriction of Chemicals, was introduced in 2006 as a comprehensive measure to manage the health and environmental risks posed by chemicals (Williams et al., 2009).

REACH regulations, introduced in 2006, required companies to register all chemical products, test them according to specified protocols, and then have them evaluated by the European Chemicals Agency. Depending on the evaluation, substances could be approved, restricted, or banned based on their potential health or environmental risks (Tyler & Han, 2019).

In response to these regulations, most retailers and brands developed their own lists of restricted chemicals, particularly those used in dyeing and finishing textiles, to ensure compliance with REACH. This led to a significant focus on compliance and the search for technical solutions to meet these regulatory requirements. However, the design process in the textile/apparel sector continued largely unchanged, with environmental considerations not being a central concern (Tyler & Han, 2019).

EU policies are seen as a significant influence on the industry's move towards greater transparency and traceability, with potential global ramifications. The development of global data standards for circularity-linked life-cycle data by 2035 is seen as both probable and desirable, with a significant emphasis on the need for European Union (EU) regulations to require the free availability of textiles' circularity-related lifetime data (Luoma et al., 2022).

There is a focus on the use of distributed-ledger technology, such as blockchain, to verify the origin of raw materials in textiles. By 2035, it is envisioned that a certain share of textiles produced worldwide will have their raw materials' origin verified through this technology. This indicates a move towards greater transparency and accountability in the textile supply chain, ensuring that the materials used are sourced responsibly and sustainably. Distributed-ledger technology offers a secure and immutable record of transactions, which can significantly enhance the traceability of raw materials, contributing to more ethical and sustainable textile production practices (Luoma et al., 2022).

3.2.1.2. *Municipal/Local Governance*

Municipalities and local governments play a vital role in enforcing strategies for the transition towards a circular economy through diverse governance modes, including self-governance, provision, authority, and enabling. Municipalities manage their resources and services,

enforce circular principles through regulations, and foster stakeholder collaboration to promote circular initiatives. The application of these modes in real-world case studies shows their effectiveness in enhancing material recirculation and advancing circularity, underscoring the significant impact local governments can have in facilitating the transition to a circular economy (Christensen, 2021).

The local governance role is especially pronounced in Scandinavian countries, where municipalities are deeply involved in planning and regulatory activities that intersect with circular economy objectives. For example, Bornholm, an island municipality, played a pivotal role in transitioning towards a circular economy, particularly in the construction sector. Its geographical isolation fostered a close-knit network of local stakeholders in the construction industry, facilitating collaboration and personal connections among them (Corvellec & Stål, 2019).

3.2.1.3. *Non-EU Countries or Regions*

The Hong Kong Research Institute of Textile & Apparel (HKRITA), funded by the Hong Kong government and the Innovation and Technology Fund (ITF), along with support from entities like the H&M Foundation, represents an initiative emerging from a non-EU source. It focuses on applied research to support the textile, apparel, and fashion industries with a significant emphasis on circularity and recycling challenges, driven by industrial needs and stakeholder discussions (Keh, 2020).

In Canada, the first provincial circular economy (CE) strategy includes 15 specific actions aimed at building up the province's CE and reducing greenhouse gas emissions from landfills. It addresses all sources of waste, focusing not just on residential waste managed by municipalities but also on waste generated by the industrial, commercial, and institutional (ICI) sectors. The strategy mentions clothing and textiles as a group of products that provide particular opportunities for reducing waste volume through regulations under the Resource Recovery and Circular Economy Act 2016 (Koszewska et al., 2020).

These categorizations reflect the diverse sources of initiatives aiming to promote the circular economy in textiles and other industries, ranging from EU-wide regulatory frameworks and funding for research and innovation projects to local governance strategies and non-EU research and development efforts.

3.2.1.4. Industry and Regulatory Standards

Industry standards play a significant role in shaping sustainable strategies within organizations by serving as benchmarks and guidelines that help companies align their operations with best practices for sustainability. These standards often emerge from collective industry initiatives or regulatory bodies and provide a framework for measuring, managing, and reporting sustainability performance. They help in establishing clear objectives, methodologies, and targets for sustainable practices, which businesses can adopt to improve their environmental and social impact.

The British Standards Institution's BSI standard 8001:2017, titled "Framework for implementing the principles of the circular economy in organizations," serves as a guidance document designed to assist organizations and individuals in understanding and adopting circular economy principles. The standard aims to help organizations transition to more sustainable and circular practices by providing a flexible framework (Rossi et al., 2020).

This standard outlines six types of Business Models fitting within the circular economy system. These models are based on principles such as on-demand, dematerialization, product life cycle extension/reuse, recovery of secondary raw materials/by-products, product as service/product-service system (PSS), and sharing economy and collaborative consumption (Christensen, 2021).

Organizations such as the Sustainable Clothing Action Plan (SCAP) and the US Sustainable Apparel Coalition (SAC) set forth principles and targets aimed at reducing waste, improving resource efficiency, and enhancing the sustainability of supply chains. Companies engage with these standards in three primary ways, categorized as 'ideal', 'adapt', and 'adopt'. 'Ideal' companies, such as major brands like NIKE, M&S, and H&M, are at the forefront, pushing the boundaries of sustainable practices and influencing the industry's direction. 'Adapt' companies follow the leaders, implementing sustainable practices to a lesser extent. 'Adopt' companies are built around sustainability from their inception, often operating within niche markets and leading in sustainable design within those niches (Claxton & Kent, 2020).

In conclusion, the intricate interplay between regulations, industry standards, and innovative strategies within the fashion sector underscores a pivotal shift towards sustainability and circular economy practices. The European Commission's Circular Economy Action Plan, alongside other regulatory initiatives such as the WEEE Directive and REACH regulations, has set

a robust framework that compels the fashion industry to rethink and remodel its operational strategies. These regulatory frameworks, coupled with the proactive adoption of sustainable models such as Design for Environment (DfE), Extended Producer Responsibility (EPR), and the Horizon 2020 projects like Resyntex, illustrate a clear trajectory towards reducing environmental footprints and fostering a sustainable future. As the industry responds to these regulatory pressures with adaptive strategies, there is a noticeable evolution towards more eco-conscious and circular practices, signaling a transformative phase in the fashion sector.

Furthermore, the role of local governance and non-EU initiatives in advancing circular economy principles highlights the global and collaborative effort required to achieve sustainable transformation in the fashion industry. The involvement of municipalities, the initiatives by non-EU countries and regions, and the establishment of industry and regulatory standards such as BSI standard 8001:2017, collectively contribute to a comprehensive approach towards sustainability. This collective endeavor not only enhances material recirculation and sustainability in the fashion industry but also sets a precedent for other sectors to follow. As we move forward, the synergy between regulatory frameworks, industry standards, and innovative sustainable strategies will undoubtedly play a crucial role in shaping a more sustainable and circular fashion industry, echoing the global call for environmental stewardship and responsible resource management.

3.2.2. Idiosyncratic Motives

In our exploration of the independent and uncoordinated emergence of circularity strategies within organizations, we observe a fascinating spectrum of approaches that fashion companies adopt, driven by their unique, idiosyncratic motives. These strategies, arising not from a collective industry mandate but from individual organizational values, innovation pursuits, and strategic visions, highlight the diverse pathways through which the fashion industry is embracing sustainability and circularity. Based on our observations and analysis, we have categorized these independently emerged strategies into five distinct groups: circular strategies for recycling, waste management, circular business model, product design, and production. Each category represents a different facet of the circular economy, tailored by the unique drivers and aspirations of individual organizations.

3.2.2.1. Circular Strategies for Recycling

In the evolving landscape of the fashion industry, circularity strategies for recycling have emerged as pivotal components in the quest for sustainability. These strategies, leveraging the latest in technology and innovation, aim to transform the lifecycle of textiles, ensuring that every garment can have a new lease on life, thereby reducing waste and promoting environmental stewardship.

- **Mechanical Recycling: A Foundation for Sustainability**

Mechanical Recycling (Keh, 2020) stands as a testament to the industry's ingenuity, repurposing clothes into fibers and then into new fabrics. The beauty of this method lies in its simplicity and compatibility with existing machinery. Despite its advantages, the challenge of shortened fiber lengths and resultant material quality reduction cannot be overlooked. Diving deeper, Textile Recycling and Waste Sorting (Niinimäki & Karell, 2019) sheds light on mechanical recycling's critical role in managing pre-consumer waste, advocating for the integration of virgin materials to uphold quality, a practice particularly viable for pre-consumer waste due to its pristine condition.

- **Chemical Recycling: Pushing the Boundaries**

The realm of Chemical Recycling is marked by the pursuit of efficiency and innovation. With Innovative Chemical Processes (Keh, 2020), the industry explores the dissolution of used apparel to reclaim valuable materials, a boon for synthetic fibers. Yet, the shadow of high chemical costs and environmental repercussions looms large. Chemical and Thermal Recycling Technologies (Niinimäki & Karell, 2019) herald the dawn of advanced solutions, transforming low-value waste into precious raw materials and championing the cause of upcycling. Meanwhile, Biochemical Recycling Processes (Leal Filho et al., 2019) highlight transformative projects like EU Resyntex, turning the tide for textiles deemed unsuitable for conventional recycling methods.

- **Biological Recycling: Embracing Nature's Wisdom**

In the gentle embrace of nature, Biological Recycling (Keh, 2020) utilizes enzymes and fermentation, celebrating the virtues of energy efficiency. However, the slow pace and efficiency hurdles present significant challenges for widespread adoption. The vision of a Bio-Based Circular Economy (Ribul et al., 2021) champions bio-based technologies, promising an era where textile production and recycling are in harmony with nature, emphasizing environmentally friendly processes and compostable end-of-life solutions.

- **Digitalization and Upcycling Strategies: The New Frontier**

The fusion of technology and creativity breathes life into Digitalization and Upcycling Strategies. The exploration of CAD and Digital Technologies in Upcycling (Bandulahewa & de Silva, 2020) reveals the potential of 3D CAD technology to revolutionize the refashioning of secondhand clothing (SHC), merging efficiency with environmental consciousness. The art of Refashioning and Upcycling with CAD (Bandulahewa & de Silva, 2020) stands as a beacon of innovation, while Blockchain and IoT for Supply Chain Transparency (Bandulahewa & de Silva, 2020) pave the way for a future where every step of the recycling process is clear as day, ensuring accountability and fostering responsible production and consumption.

- **Bio-Based Recycling in a Circular Economy: Closing the Loop**

The narrative of Closed-Loop Bio-Based Recycling (Ribul et al., 2021) speaks of a sustainable future where bio-based technologies are the keystones of the textile lifecycle, minimizing environmental impacts and championing compostable end-of-life options.

- **Textile-to-Textile Recycling Challenges and Solutions: Overcoming Obstacles**

The journey towards sustainable textile recycling is fraught with challenges, as elucidated in Challenges in Textile-to-Textile Recycling (Sandvik & Stubbs, 2019). The path forward is illuminated by innovative material design, enhanced garment collection, and the spirit of collaboration, navigating through the maze of technological limitations and complex supply chains.

- **Advanced Recycling Circularity Strategies: Shaping the Future**

Technological Advancements in Recycling (Niinimäki & Karell, 2019) underscore the relentless pursuit of progress, refining mechanical and chemical recycling methods, and embedding intentional design for recyclability at the heart of the industry, setting the stage for a circular economy where material recovery is maximized.

In conclusion, the tapestry of circularity strategies for recycling in the fashion industry is rich and diverse, each thread interwoven with the others to create a sustainable future. From the tangible benefits of mechanical and chemical recycling to the visionary approaches of biological recycling and digital upcycling, the industry stands on the cusp of a revolution. As we navigate through the challenges and embrace the opportunities, the collective endeavor towards a circular economy in fashion continues to unfold, promising a world where sustainability is not just a goal, but a reality.

3.2.2.2. *Circular strategies for Waste management*

The fashion industry, a significant contributor to global waste, is pivoting towards sustainability through the adoption of circularity strategies. These initiatives are aimed at minimizing waste and maximizing the utility of resources, ensuring fashion products enjoy extended lifespans, and waste materials find new life in innovative applications. This transition is not just about waste reduction; it's a comprehensive reimagining of the fashion lifecycle, rooted in the principles of a circular economy.

- **Waste Collection and Consumer Participation**

The first step towards a circular fashion industry is the establishment of efficient waste collection systems, complemented by active consumer participation.

- **Eco points, Thrift Stores, and Take-Back Programs:** These initiatives serve as the primary conduits for collecting used garments, ensuring they are either recycled or repurposed. By making garment disposal convenient and accessible, these programs encourage consumer participation in the circular economy (Dos Santos & Campos, 2021).
- **Structural and Temporal Core–Compartment Separations:** This innovative approach allows retailers to seamlessly integrate garment collection into their operations. By compartmentalizing collection activities, retailers can maintain their core business focus while contributing to sustainability efforts, showcasing a balance between commercial objectives and environmental responsibility (Stål & Corvellec, 2022).

- **Recycling Innovations and Material Recovery**

At the heart of circular fashion are the recycling innovations and material recovery techniques that transform textile waste into valuable resources.

- **Mechanical and Chemical Recycling:** These recycling methods breathe new life into old textiles, converting them into fresh fibers ready for the next fashion cycle. This regenerative approach underpins the industry's move towards sustainability, ensuring materials remain in use for as long as possible (Dos Santos & Campos, 2021).
- **Catalytic Degradation and Co-pyrolysis:** These processes represent a leap forward in waste management, converting textile waste into vital commodities like aromatic

hydrocarbons. This synergy between textile and plastic waste recycling exemplifies the integrated approach needed for effective waste management (Wang et al., 2021).

- **Green Technology for Fiber Recovery:** Tailored specifically for challenging materials like denim, these eco-friendly techniques enhance the industry's capacity to recover valuable fibers from complex waste streams, furthering the goal of comprehensive material recovery (Yousef et al., 2020).

- **Development of Eco-Friendly Materials**

The drive towards sustainability is also sparking innovation in material development, opening up new avenues for the application of recycled textiles.

- **Construction Materials from Recycled Textiles:** This groundbreaking initiative repurposes textile waste fibers for the construction industry, offering a sustainable alternative to traditional building materials. By bridging the gap between fashion waste management and green construction, this strategy exemplifies the cross-sectoral collaboration essential for a sustainable future (Salah et al., 2022).
- **Wool Powder for Textile Functionalization:** Transforming waste wool into functional powders for textile enhancement represents an innovative approach to adding value to waste materials. This strategy not only extends the utility of waste wool but also contributes to the development of high-performance textiles, demonstrating the potential of waste materials to drive innovation in product development (Tang et al., 2022).

- **Optimization of Waste Management Systems**

The effective management of waste in the fashion industry is increasingly reliant on digital technologies and strategic system optimization.

- **Mathematical Modeling for Optimized Waste Processing:** The application of mathematical models to optimize the planning and operation of waste treatment facilities represents a strategic approach to minimizing environmental impacts and maximizing operational efficiency. This precision-driven strategy is crucial for developing an effective waste management infrastructure (Pluskal et al., 2021).
- **Digitalization in Waste Stream Management:** The adoption of digital tools and data analytics is streamlining circular practices within the textile industry, enhancing

transparency and efficiency across the waste management chain. This digital transformation is key to optimizing waste management systems and ensuring the seamless integration of circular economy principles (Luoma et al., 2022).

The fashion industry's commitment to integrating circularity strategies signifies a pivotal shift towards more sustainable and responsible waste management practices. By adopting a holistic approach that encompasses everything from waste collection to consumer education, the industry is laying the groundwork for a future where fashion is not only stylish but also sustainable. This comprehensive strategy addresses the immediate challenges of fashion waste and sets a new standard for industry practices, ensuring the long-term sustainability of the fashion sector in harmony with environmental stewardship.

3.2.2.3. CE business model

The fashion industry, historically characterized by its considerable environmental impact due to rapid consumption and waste, is on the cusp of a transformative shift towards sustainability. This shift hinges on the adoption of circular economy principles, which advocate for the innovative reuse, recycling, and reimagining of fashion products and processes. By exploring diverse strategies, this narrative aims to guide micro, small, and medium enterprises (MSMEs) in the fashion sector to seamlessly integrate these principles into their business models. The goal is to foster environmental stewardship, enhance sustainability, and ensure the industry's long-term resilience and prosperity.

- **Dynamic Capabilities and micro-foundations**

To successfully adapt to the dynamic and competitive landscape of the fashion industry, MSMEs need to leverage dynamic capabilities and micro-foundations, which are instrumental in fostering innovation and circular economy practices.

- **Market Sensing and Seizing:** This strategy is crucial for MSMEs to proactively identify emerging opportunities within the circular economy, such as the adoption of sustainable materials or tapping into the growing consumer demand for eco-friendly products. By sensing shifts in market trends and consumer preferences, businesses can seize these

opportunities to innovate and differentiate their offerings, aligning with environmental sustainability goals (Elf et al., 2022).

- **Reconfiguring Resources:** Emphasizes the importance of agilely adjusting business strategies, operations, and resource allocations to support circular economy initiatives effectively. This could involve innovating production processes, adopting new business models like product-service systems, or rethinking supply chain logistics to enhance sustainability and resource efficiency, ensuring that the business remains competitive and sustainable in the long run (Salmi & Kaipia, 2022).

- **Recycling Business Models (RBMs)**

Recycling Business Models (RBMs) play a pivotal role in minimizing waste and enhancing resource efficiency by advocating for the recovery, reuse, and recycling of materials within the fashion industry.

- **Extended Product Lifecycle:** This strategy promotes the design of products with durability, modularity, and repairability in mind, aiming to prolong their life span and usability. By creating high-quality, timeless pieces, the industry can significantly reduce waste generation and encourage a more sustainable consumption pattern among consumers (Martina & Oskam, 2021).
- **Resource Recovery:** Focuses on developing and implementing processes for efficiently reclaiming materials from products at the end of their life cycle. This not only facilitates the reintroduction of these materials into the production cycle, minimizing the need for virgin resources, but also significantly reduces the environmental impact associated with waste disposal (Rossi et al., 2020).
- **Collaborative Value Chains:** Encourages the creation of synergistic partnerships across the fashion value chain, from material suppliers to end-of-life management entities. These collaborations can lead to innovations in material sourcing, production, and waste management, ensuring the seamless integration of circular practices throughout the product lifecycle (Tunn et al., 2019).

- **Scaling Circular Business Models**

The expansion of circular practices across the fashion industry is essential for achieving a significant and lasting impact on sustainability.

- **Scaling Out:** This strategy involves extending the geographical reach and market penetration of circular business models, aiming to mainstream sustainability practices across new regions and consumer demographics. By replicating successful circular practices in diverse markets, the fashion industry can significantly amplify its positive environmental impact (Sandberg & Hultberg, 2021).
- **Scaling Up:** Focuses on influencing broader systemic changes such as policy reforms, industry standards, and consumer norms to facilitate the widespread adoption of circular business models. This involves engaging with policymakers, industry coalitions, and consumer advocacy groups to create an enabling environment for circular practices (Kant Hvass & Pedersen, 2019).
- **Scaling Deep:** Aims to foster a deep-rooted cultural and normative shift towards sustainability and circularity in consumer behavior and societal values. By changing the narrative around fashion consumption, this strategy seeks to promote values of sustainability, minimalism, and conscious consumerism, driving a fundamental change in how fashion is perceived and consumed (Beyer & Arnold, 2020).

- **Business Model Components for Circular Economy**

Integrating circular economy principles into the fashion industry necessitates a fundamental transformation in business models, ensuring that sustainability is interwoven throughout every aspect of operations, from supply chains to customer engagement. This transformation is reflected in key business model components such as Key Resources, Key Activities, Customer Segments, and Channels, as outlined below:

- **Key Resources - Circular Supplies:** The adoption of sustainable input materials fundamentally alters the Key Resources component of business models (Bassett, 2020). Transitioning to renewable, recyclable, and bio-based materials requires a systemic overhaul of procurement practices and collaboration with suppliers. This strategy ensures that the materials used in production are part of a circular system, thereby reducing environmental impact and waste. The focus on sustainable inputs transforms the resource

base of fashion businesses, making sustainability a core element of their value offering (Bassett, 2020).

- **Key Activities - Product Life Extension:** Enhancing the lifespan of fashion products through repair, maintenance, refurbishment, and resale impacts the Key Activities component of business models (Bassett, 2020). Designing for longevity necessitates the incorporation of new activities such as maintenance services and resale platforms, challenging the industry's prevailing throwaway culture. By embedding these activities into their operations, fashion businesses can reduce the demand for new materials and promote a culture of sustainability and product care (Bassett, 2020).
- **Channels-Sharing Platforms:** The development of digital platforms for shared access to fashion items signifies a shift in the Channels component of business models (Rossi et al., 2020). This model leverages technology to facilitate sharing, leasing, or subscription-based access, thus offering an alternative to traditional retail channels. By providing a platform that connects users and enables efficient sharing, fashion businesses can reduce the overall need for product ownership, thereby decreasing resource consumption and waste. The success of this model depends on creating a user-friendly and reliable system that ensures the quality and availability of items, fostering a sense of community and shared use (Rossi et al., 2020).
- **Customer Segments - Consumer Engagement:** Actively involving consumers in circular economy initiatives influences the Customer Segments component of business models by targeting environmentally conscious consumers (Kant Hvass & Pedersen, 2019). Implementing take-back schemes, recycling programs, and engaging consumers in co-creation efforts not only serves to educate and foster dialogue around sustainability but also incentivizes participation. This approach helps to cultivate a dedicated consumer base that is actively involved in circular practices, driving a broader cultural shift towards sustainability in fashion (Beyer & Arnold, 2020).

Through the adoption and implementation of these strategies, fashion MSMEs can lead the transformation towards a more sustainable, circular, and resilient industry. By embracing circular economy principles, the fashion sector can mitigate its environmental impact, foster innovation, and secure its long-term viability in a rapidly changing global landscape.

3.2.2.4. *Product design*

The urgent need for sustainability in the fashion industry has led to a significant focus on circularity strategies in product design. These strategies aim to reduce environmental impact through innovative design practices that ensure products are durable, reusable, and recyclable. This text reorganizes various design-related strategies into coherent categories, providing clear explanations for each and maintaining the original references to enhance clarity and coherence, with each reference individually noted to ensure precise attribution.

- **Design for Longevity and Durability**

- **Design for Longevity:** This strategy emphasizes creating timeless and durable garments to extend their lifecycle, thereby reducing the need for frequent replacements and lowering consumption rates. It involves the development of sustainable materials that can be regenerated from renewable or waste sources (T. Kim et al., 2022).
- **Technical Durability and Environmental Impacts:** Focuses on preventing common failures like color fading and fabric wear to extend garment use and reduce environmental impacts. It underlines the importance of garment durability to lessen carbon, water, and waste footprints (Cooper & Claxton, 2022).
- **Design for Slowness and Longevity:** Encourages creating garments influenced more by lasting quality and style than by fast fashion trends, promoting prolonged use and reducing waste (Maldini et al., 2019).

- **Design for Emotional Engagement**

- **Consumer Influence and Emotional Durability:** Highlights designs that foster a deeper connection between the wearer and the garment, encouraging longer use and better care through emotional attachment (Cooper & Claxton, 2022).
- **Design for Emotional Durability:** Aims to enhance the garment's lifespan through emotional value, utilizing high-quality materials, timeless design, and personalization options to strengthen the bond between the wearer and the garment (Haegglom & Budde, 2020).

- **Design for Adaptability and Disassembly**
 - **Design for Disassembly:** Advocates for easily disassemblable garments at their lifecycle's end, facilitating recycling or composting and enhancing repairability and adaptability. It includes strategies like mono-material design for simpler recycling and designing for functional durability (T. Kim et al., 2022).
 - **Multifunctional, Transformable, and Modular Garments:** Focuses on designing garments with multiple purposes, transformable styles, or interchangeable parts to increase their utility and lifespan (Maldini et al., 2019).

- **Design for Circular Business Models**
 - **Circular Fashion Model:** Discusses the adoption of reuse, recycling, and upcycling models to improve sustainability and address environmental impacts (Cooper & Claxton, 2022).
 - **Service-based Fashion Systems:** Explores owning alternatives, such as renting or leasing, to extend garment use and reduce the necessity for individual ownership of numerous items (Maldini et al., 2019).

- **Innovation in Product Development Processes**
 - **Fashion Product Development Process for Online Fast Fashion:** Highlights the need for agility and flexibility in the fast-paced online fashion sector, advocating for a circular model that responds quickly to consumer trends and minimizes waste (Parker-Strak et al., 2020).
 - **Designing Products for the Circular Economy:** Emphasizes integrating sustainability into the design process and advocating for a cultural shift within the supply chain to prioritize durability, resource efficiency, and recyclability from the outset (Tyler & Han, 2019).

- **Sustainable Materials and Practices**
 - **Sustainable Fibers and Manufacturing Processes:** Focuses on utilizing sustainable materials and processes that minimize environmental footprints, advocating for efficient resource use and reduced chemical usage in production (Claxton & Kent, 2020).

- **Slow Fashion as a Design Strategy:** Advocates for materials with low environmental impact, emphasizing reducing carbon footprints and respecting labor conditions throughout the garment's lifecycle (Moreira da Silva, 2021).

Circularity strategies in fashion product design are crucial for advancing sustainability. Focusing on design for longevity, emotional engagement, adaptability, circular business models, and sustainable material use significantly reduces environmental impact. Each strategy, from creating durable and timeless garments to integrating sustainability into the product development process, contributes to a more sustainable and circular fashion ecosystem. This reorganization highlights the critical role of design in achieving a sustainable future for the fashion industry, with each reference meticulously noted to ensure comprehensive understanding and attribution.

3.2.2.5. Production and manufacturing

The push towards a sustainable fashion industry is fundamentally linked to adopting circular economy principles, with a significant focus on transforming production practices. This shift involves deploying strategies that reduce environmental impacts, improve resource efficiency, and promote the longevity and recyclability of fashion items. We'll explore key production-centric strategies drawn from various studies, offering insights into achieving greater sustainability in fashion manufacturing.

- **Efficient Resource Management and Cleaner Production**

This category encompasses strategies aimed at optimizing the use of resources and implementing cleaner production methodologies to minimize waste and environmental pollution.

- **Optimizing Raw Material Use:** Prioritizing the efficient utilization of raw materials to reduce waste at the source. This involves careful planning and innovative design to ensure materials are used judiciously, reflecting a foundational aspect of cleaner production (de Oliveira Neto et al., 2022).
- **Renewable Energy Adoption:** Transitioning to renewable energy sources within production facilities to lower the carbon footprint associated with manufacturing processes. This strategy is crucial for reducing reliance on fossil fuels and promoting cleaner, more sustainable energy use in production (Zhao et al., 2021).

- **Water Efficiency in Production:** Implementing practices that enhance water use efficiency, especially in water-intensive segments like cotton production for denim. Techniques include adopting water-saving technologies and optimizing irrigation practices to conserve water resources (Zhao et al., 2021).
- **Integration of Environmental Management Systems:** Embedding cleaner production practices within environmental management frameworks to ensure continuous improvement. This includes conducting regular environmental audits and engaging employees in sustainability initiatives (de Oliveira Neto et al., 2022).

- **Material Innovation and Circular Inputs**

Focusing on the selection and recovery of materials, this theme highlights the importance of using sustainable, non-toxic, and recyclable materials in fashion production.

- **Use of Recycled and Biodegradable Materials:** Encouraging the use of recycled fibers, such as recycled cotton, and developing biodegradable materials from alternative sources like food waste. These strategies support the circular economy by promoting material recovery and reducing the demand for virgin resources (Fidan et al., 2021) (Provin et al., 2021).
- **Advancements in Biotechnology for Material Production:** Leveraging biotechnological innovations to create sustainable textiles from bio-based or waste materials, contributing to zero-waste production processes and enhancing the sustainability of material sources (Provin et al., 2021).

- **Sustainable Production Techniques**

This category delves into specific techniques and practices that directly contribute to making the production process more sustainable and aligned with circular economy goals.

- **Cleaner Production Techniques in Denim Manufacturing:** Adopting environmentally friendly practices specifically tailored to denim production, addressing the unique challenges of this sector, such as high water and energy consumption, and significant waste generation (Zhao et al., 2021).
- **Innovative Manufacturing Systems:** Designing and implementing manufacturing systems that are not only efficient but also minimize environmental impacts. This includes

the adoption of energy-efficient machinery, reduction of chemical use, and the implementation of closed-loop systems that recycle waste back into production (Mishra et al., 2020).

- **Collaborative Efforts for Sustainable Production**

Acknowledging the role of collaboration across the industry to enhance sustainability in production practices, this theme emphasizes partnerships and shared initiatives.

- **Intersectoral Collaboration for Biotextiles:** Fostering partnerships between the food industry and textile manufacturers to utilize food waste as raw materials for textile production, showcasing an innovative approach to sustainable material sourcing (Provin et al., 2021).
- **Eco-Industrial Parks:** Creating collaborative spaces where businesses can share resources and infrastructure, reducing overall environmental impacts and promoting synergies in waste management and resource use (Mishra et al., 2020).

By focusing on production-specific strategies across the themes of Efficient Resource Management and Cleaner Production, Material Innovation and Circular Inputs, Sustainable Production Techniques, and Collaborative Efforts for Sustainable Production, the fashion industry can significantly advance its sustainability agenda. Explained Strategies provide a roadmap for manufacturers to reduce environmental impacts, optimize resource use, and move towards a more circular and sustainable production model. Implementing these strategies requires a concerted effort from all stakeholders in the fashion industry, from designers and manufacturers to consumers and policymakers, ensuring a collective move towards a more sustainable future.

In conclusion, idiosyncratic motives are fundamental in shaping the adoption of circularity strategies within the fashion industry, as they stem from the unique values, strategic visions, and innovative pursuits of individual organizations. This internal drive for sustainability, highlighted through the adoption of diverse circular strategies such as recycling, waste management, and eco-friendly product design, underscores the importance of aligning sustainability initiatives with an organization's core identity and operational context. Such alignment not only ensures the seamless

integration of circular practices into business models but also fosters a genuine commitment to environmental stewardship. By leveraging their distinct capabilities and market positions, companies can craft innovative and effective solutions to sustainability challenges, demonstrating the transformative potential of idiosyncratic motives in propelling the fashion industry towards a more circular and sustainable future.

3.2.3. Value chain considerations

In our exploration of value chain considerations as a precursor to circularity strategies within the fashion industry, we observe a collaborative dynamic that extends beyond the boundaries of individual organizations to encompass the entire ecosystem, from raw material sourcing to end consumers. This approach recognizes the interconnected nature of the fashion value chain and the collective impact that can be achieved when different actors work together towards shared sustainability goals. Through our analysis, we have identified two primary categories of strategies that emerge from value chain considerations: Consumer Engagement and Collaboration and Participation. These categories reflect the dual focus on involving end-users in the circular economy and fostering partnerships among businesses, suppliers, and other stakeholders to create a cohesive and sustainable value chain.

As we delve into each of these strategic categories, we aim to unpack the specific drivers and mechanisms that encourage their adoption within the fashion industry. Consumer Engagement strategies seek to empower and involve the end consumer in the circular process, through initiatives like take-back schemes, product leasing, and awareness campaigns, thereby extending the lifecycle of garments and reducing waste. On the other hand, Collaboration and Participation strategies focus on building synergies between different value chain actors, including joint ventures in sustainable material development, shared resource platforms, and collective recycling efforts. By examining the nuances of these strategies, we gain a deeper understanding of how value chain considerations catalyze a more integrated and cooperative approach to circularity in the fashion sector, setting the stage for a comprehensive analysis of each category in subsequent discussions.

3.2.3.1. *Consumer engagement*

The fashion industry's shift towards circularity requires innovative and multifaceted strategies to engage consumers effectively. This detailed categorization reflects on the various approaches outlined in the referenced papers, illustrating how the industry can adapt to meet sustainability goals through consumer engagement. By understanding the nuances of these strategies, stakeholders can better navigate the challenges and opportunities of promoting circular fashion.

- **Brand and Consumer Value Proposition**

This category highlights the importance of aligning brand value with consumer expectations for sustainability and affordability:

- **Brand Status and Value Proposition:** By emphasizing the economic and brand value of products, companies can appeal to consumers' desire for cost-effective, branded apparel, thus encouraging a shift towards circular fashion models (Ramkumar et al., 2021).
- **Innovative Business Models and Material Use:** Showcasing innovative approaches, such as using recyclable materials and engaging in reforestation efforts, reinforces a brand's commitment to environmental sustainability. This strategy not only addresses environmental concerns but also resonates with consumers' growing demand for responsible brands (Vătămănescu et al., 2021).

- **Sustainability and Ethical Consumption**

Fostering ethical consumption and sustainability through informed choices and corporate responsibility:

- **Promoting Ethical Consumption:** Encouraging the adoption of sustainable materials and ethical production processes can cultivate a culture of responsible consumption. Highlighting these efforts helps consumers make informed choices that align with their values (Saha et al., 2021).
- **Critical and Ethical Consumption:** This strategy involves steering consumers away from the fast fashion model by promoting sustainable practices. Emphasizing the environmental and social impact of their choices can motivate consumers to opt for second-hand or ethically produced clothing (Machado et al., 2019).

- **Corporate vs. Consumer Moral Duties:** Acknowledging the shared moral responsibilities between corporations and consumers for supporting circular initiatives reinforces the notion that sustainable fashion is a collective effort. This mutual understanding can strengthen consumer engagement with brands that are actively pursuing sustainability goals (Ki et al., 2021).

- **Engagement through Technology and Innovation**

Utilizing digital innovation and services to promote circular fashion practices:

- **Leveraging Social Media Influencers:** Influencers can play a crucial role in shaping consumer attitudes towards sustainability. Their reach and impact, especially among younger demographics, can drive awareness and adoption of circular fashion practices (Colasante & D'Adamo, 2021).

- **Product-Oriented and Use-Oriented PSSs:** Product-Service Systems (PSSs) are defined as a combination of tangible products and intangible services designed to fulfill specific customer needs. Product-oriented PSSs involve the transfer of product ownership from companies to customers, supplemented by services, making them less circular compared to use-oriented PSSs, which do not involve ownership transfer. Despite this, both types are considered promising for initiating the transition to a circular fashion industry.

These systems provide a framework for extending the lifecycle of fashion products through services like repair, maintenance, and rental. PSSs can leverage digital platforms to engage customers, providing them with easy access to services such as renting, sharing, or subscribing to fashion items. Also, by offering consumers options that reduce the need for new purchases, these models promote resource efficiency and sustainability within the industry (Khitous et al., 2022).

- **Community and Social Engagement**

Building a sense of community and leveraging social dynamics to enhance engagement:

- **Social Facilitation and Community Engagement:** Social facilitation, originally identified in psychological studies, refers to the enhancement of an individual's performance when in the presence of others, either through co-action effects or the audience effect. This phenomenon has been observed in various contexts, including consumer behavior in both physical and virtual environments, where the presence of others can lead to more positive

experiences and increased engagement. In the context of Circular Fashion Services (CFS), which are platforms that facilitate a circular exchange of secondhand clothes among users by collecting used clothes and re-selling them, communicating the presence and benefits derived by other consumers using CFS can create a socially facilitating environment. This environment, in turn, fosters a favorable attitude towards the service, encouraging more participation due to the perceived social benefits and the inherent nature of collaboration and sharing within CFS. This strategy taps into the social nature of consumers, motivating them to be part of a collective effort towards sustainability (Ramkumar et al., 2021).

- **Utilizing Social Media Influencers:** The credibility and attractiveness of influencers significantly impact consumer attitudes towards Online Second-hand Clothing Rental Platforms (OSCRP) and other circular fashion initiatives. Influencers who resonate with the target audience can effectively promote engagement and adoption of sustainable practices (Shrivastava et al., 2021).
 - **Impact of Corporate Moral Responsibility:** Demonstrating a genuine commitment to circular fashion can positively influence consumer attitudes. When companies are perceived to uphold their moral responsibilities towards sustainability, it fosters trust and loyalty among consumers, encouraging them to support and engage with circular initiatives (Ki et al., 2021).
- **Narrative and Storytelling**

Using storytelling to connect with consumers on a personal level and build trust in circular fashion services:

- **Narrative Competence Theory and Trust:** Integrating product history narratives into marketing and engagement efforts can significantly enhance consumer trust. Sharing stories about an item's origin, previous ownership, and lifecycle can make the purchasing experience more personal and meaningful, encouraging consumers to engage with second-hand and circular fashion offerings (N. (Lauren) Kim et al., 2021).
- **Role of Consumer Moral Responsibility:** Highlighting personal narratives and emphasizing consumers' moral responsibility towards sustainable fashion encourages reflection on their purchasing behaviors. This approach can lead to a deeper engagement

with circular practices, as consumers begin to see their choices as part of a larger ethical and environmental context (Ki et al., 2021).

The detailed exploration of strategies for engaging consumers in the circular fashion industry underscores the complexity and diversity of approaches needed to foster sustainability. From leveraging brand value and innovative business models to promoting ethical consumption, utilizing technology, building community, and employing effective storytelling, these strategies offer a comprehensive roadmap for brands looking to navigate the shift toward a more sustainable and circular fashion industry. By embracing these approaches, the fashion sector can align more closely with consumer expectations and environmental goals, paving the way for a more sustainable future.

3.2.3.2. *Collaboration and participation*

The fashion industry, with its global reach and significant environmental footprint, stands at a crossroads where sustainability and circular economy principles are becoming increasingly crucial. Collaboration across the value chain, from raw material sourcing to product end-of-life, presents a promising avenue for integrating these principles into the industry's core operations. This text aims to clarify and organize various circularity strategies for collaboration within the fashion industry's value chain, highlighting the need for collective action and innovation to transition towards a more sustainable future.

- **Integration and Strategic Partnerships**
 - **Vertical Integration and Contractual Power:** This strategy involves reorganizing the supply chain towards a more vertically integrated structure where central firms, or hub firms, orchestrate the network of suppliers. The aim is to develop mutual trust and commitment, facilitating long-term agreements that enhance information sharing and integrate operational processes. This centralization aims to streamline the supply chain, making it more responsive and adaptable to circular economy demands (Bressanelli et al., 2022).
 - **Level of Cooperation and Time Horizon:** The strategy discusses a significant increase in cooperation among supply chain actors, transitioning from low to high collaboration levels. This is particularly evident in strategic processes such as the design of collections and product development, where early supplier involvement becomes commonplace. Additionally, the shift from short-term transactions to long-term partnerships ensures

capacity utilization even during demand fluctuations, emphasizing the strategic benefits of durable relationships (Bressanelli et al., 2022). Through a case study in the Prato Industrial District, Gamma, a first-tier supplier, coordinates a network of specialized phase suppliers to produce regenerated wool from scraps and leftovers, emphasizing sustainability and efficiency. The company fosters long-term, mutually beneficial relationships with its suppliers, supporting them financially and technically, and ensuring transparency through an IT platform for data exchange. This approach exemplifies how collaborative strategies can effectively integrate Circular Economy principles into the fashion industry, showcasing Gamma's leadership in sustainable practices (Bressanelli et al., 2022).

- **Innovative Relationships – Garment Design to Garment Sample:** Focuses on the critical role of collaboration between fashion designers, retailers, and manufacturers in developing garment prototypes. Long-term supplier-buyer relationships, built on trust, are highlighted as essential for fostering innovation and supply chain agility. Examples of successful collaborations, such as those between Pinatex and Puma or Vegea and H&M, illustrate how established relationships can lead to significant innovation within the industry (Sugg, 2022).
- **Knowledge Management and Innovation**
 - **Structural Flexibility and Type of Knowledge:** The strategy highlights the transition within networks from relying on tacit knowledge to embracing more formalized knowledge systems. This shift implies a broader distribution of knowledge across the network, enhancing cooperation and fostering innovation. Structural flexibility is increased through enhanced supply chain orchestration, leading to more adaptable and responsive supply chain structures (Bressanelli et al., 2022).
- **Advanced Technologies and System Efficiency**
 - **Advanced Sorting Technologies:** Details the development of technologies for efficient sorting of textiles by material type, which is crucial for enhancing recycling capabilities. By improving the accuracy and efficiency of sorting processes, this strategy supports the broader goal of increasing the volume of materials recycled and reintegrated into the production cycle (Majumdar et al., 2022).

- **Chemical Recycling Upscaling:** Focuses on investing in chemical recycling methods to recover and reuse fibers from mixed or contaminated textiles. This approach addresses the limitations of traditional mechanical recycling, offering a path toward more sustainable material management by enabling the recycling of materials previously considered non-recyclable (Majumdar et al., 2022).
- **Integrated Approach Comprising MCDM and Mathematical Programming:** Presents a combined approach that leverages Multi-Criteria Decision-Making (MCDM) and mathematical programming to evaluate suppliers and design a sustainable Closed-Loop Supply Chain (CLSC). This strategy emphasizes the importance of advanced decision-making tools in optimizing supply chain operations for circularity, highlighting the role of technology in facilitating efficient and sustainable supply chain management (Khalili Nasr et al., 2021).
- **Multi-Level Collaboration and Systemic Change**
 - **Discrete, Aggregator, and Peripheral Collaboration Levels:** Explores strategies at various levels of collaboration, emphasizing the necessity for fashion companies to work closely with all partners in the supply network to enhance sustainability and circularity. This includes innovation in recycling, waste management systems, and engaging consumers in sustainable practices. The creation and management of Eco-industrial Parks (EIPs) are discussed as examples of aggregator-level collaboration, where businesses collectively manage environmental and resource issues (Mishra et al., 2020).
 - **Coordinating Intermediaries and Facilitating Cooperation:** Highlights the intricate role of intermediaries in bridging gaps between different actors in the value chain. By coordinating efforts, facilitating cooperation, and encouraging idea-sharing and innovation, intermediaries play a crucial role in supporting the transition towards a more circular economy in the fashion industry (Rainville, 2021). Through a case study, the subject of intermediation in promoting a circular economy within public procurement has been elaborated, focusing on the pre-procurement phase. The study involved extensive consultation activities, interviews with individuals from government, industry, and NGOs, and the application of constant comparative analysis to understand the roles and dynamics of intermediaries. The study identified six intermediaries, classified by their market-related activities (soft intermediaries), technical expertise (hard intermediaries), and project management skills (systemic intermediaries). These intermediaries were crucial in

coordinating government and industry goals, facilitating cooperation among industry players to foster new business relationships, and collaborating with the buyer to increase the use of post-consumer recycled material in the final tender. The study concludes that intermediation plays a significant role in promoting a more circular economy through public procurement, highlighting the need for coordinated efforts among multiple intermediaries with specialized knowledge to achieve sustainability goals alongside cost savings. This approach is suggested as a means to overcome challenges in public procurement, potentially positioning the public sector as a leader in the transition towards a more sustainable, circular economy (Rainville, 2021).

The fashion industry's journey towards circularity necessitates a collaborative effort that spans the entire value chain. By categorizing and explaining the diverse strategies identified in the literature, it becomes evident that the successful integration of circular economy principles requires a multi-faceted approach. This includes vertical integration, knowledge sharing, consumer engagement, advanced recycling technologies, systemic collaboration, and stakeholder engagement. Each strategy plays a crucial role in redefining the industry's relationship with the environment and society, paving the way for a sustainable future that aligns with circular economy goals. Through concerted effort and innovation, the fashion industry can achieve a transformative shift, making circularity not just an aspiration but a reality.

4. Conclusion:

This thesis delineates the emergent strategies of circularity in the fashion sector, propelled by a triad of precursors: regulatory frameworks, intrinsic motivations, and value chain dynamics. It articulates how these forces, either individually or in concert, cultivate a fertile ground for circular practices, underscoring the importance of understanding the why behind the emergence of circularity strategies to foster sustainable transformations in the industry.

4.1. Key Findings

The examination of regulations and industry benchmarks demonstrates the compelling force of external directives in driving the adoption of circular economy frameworks, mandating corporate innovation to conform with environmental and sustainability objectives. This aspect highlights the influence of regulatory frameworks as a catalyst for industry-wide change, underscoring the critical function of policy and regulatory environments in steering the fashion sector towards circular practices. It illustrates how legislative and standard-setting interventions act as key drivers in the transformation of industry norms, pushing companies toward sustainable and regenerative business models.

Idiosyncratic motives, as the second precursor, highlight the internal drivers within organizations that champion circular strategies. These motives are characterized by a company's commitment to sustainability, ethical considerations, and the pursuit of long-term business resilience. This internal drive underscores the significance of organizational culture and leadership in embedding circular economy principles into the core business model, reflecting a shift from traditional, linear approaches to more sustainable, circular practices.

The analysis of value chain considerations brings to light the complex interdependencies within the fashion industry's supply chain. It emphasizes the importance of collaborative efforts and partnerships in achieving circularity, pointing out that the transition to a circular economy necessitates a rethinking of traditional supply chain models towards more integrated, transparent, and sustainable frameworks. This perspective illustrates the necessity of embracing a holistic approach that encompasses the entire value chain, from raw material sourcing to end-of-life management, to fully realize the potential of circular strategies.

Understanding the precursors of the emergence of circularity strategies in the fashion industry is crucial for several reasons. Firstly, it allows stakeholders to anticipate and navigate the complex landscape of sustainability challenges and opportunities. By identifying the factors that drive the adoption of circular practices, businesses, policymakers, and researchers can develop more targeted and effective strategies for promoting sustainability within the industry. This understanding facilitates the creation of supportive policies, innovative business models, and collaborative initiatives that align with circular economy principles. Moreover, recognizing the diverse origins of circularity strategies—ranging from regulatory pressures to intrinsic organizational values and supply chain dynamics—enables a more nuanced approach to implementing sustainable practices. It highlights the importance of a multifaceted and adaptive strategy that considers the unique contexts and drivers within the fashion industry. This insight is pivotal for transforming the sector into a more sustainable, resilient, and environmentally friendly industry, ultimately contributing to the broader goals of sustainable development and environmental conservation.

4.2. Theoretical and Practical Implications

Theoretically, this research contributes to the expanding body of knowledge on the circular economy by contextualizing its principles within the fashion industry, a sector characterized by rapid consumption and high turnover. It bridges the gap between abstract circular economy concepts and their practical application, offering a nuanced understanding of the necessary strategies required to achieve sustainability in fashion.

Practically, the review serves as a roadmap for industry stakeholders, providing actionable insights into the adoption of circular practices. It highlights the critical need for industry-wide collaboration, technological innovation, and regulatory support to create an enabling environment for circularity. The review also underscores the role of consumers in driving demand for sustainable products, suggesting that a shift in consumer behavior, coupled with industry innovation, can significantly accelerate the transition to a circular fashion industry.

4.3. Limitations and Future Research

While comprehensive, the review acknowledges certain limitations, including the potential for publication bias and the challenge of capturing the rapidly evolving landscape of circular fashion.

The dynamic nature of the industry, coupled with the emergence of new technologies and business models, suggests that this review may only represent a snapshot of a rapidly changing field.

Future research should pivot towards longitudinal studies that chronicle the progression of circular practices within the fashion realm over extended periods. There's a pronounced need for empirical investigations to ascertain the real-world efficacy of the strategies and models pinpointed, particularly in terms of their environmental mitigation potential and sustainability promotion. Further scrutiny into the scalability and economic sustainability of successful circular initiatives will shed light on the intricate balance between ecological benefit and commercial viability, offering a clearer perspective on the hurdles and prospects that await in the pursuit of a more circular fashion industry.

4.4. Final Thoughts

The conclusion of this thesis underscores the critical role of systematic literature reviews in advancing our understanding of circular economy practices in the fashion industry. By identifying and analyzing the key circularity strategies and the source of their emergence, this study provides invaluable insights for policymakers, industry leaders, and researchers alike, offering a roadmap for future explorations and initiatives aimed at fostering sustainability in the fashion sector. The findings underscore the need for a concerted effort among all stakeholders to embrace the principles of the circular economy, highlighting the transformative potential of such strategies to revolutionize the fashion industry for the betterment of society and the environment.

The journey towards a circular fashion industry is fraught with challenges but ripe with opportunities for innovation, collaboration, and transformation. By embracing the principles of the circular economy, the fashion industry can not only mitigate its environmental impact but also redefine its value proposition in a rapidly changing world. The collective efforts of designers, manufacturers, consumers, and policymakers will be instrumental in weaving the fabric of a sustainable and resilient fashion industry, one that not only preserves the environment but also enriches our society and economy.

5. Appendices

Appendix A: List of Reviewed Studies

1. Arrigo, E. (2021). Collaborative consumption in the fashion industry: A systematic literature review and conceptual framework. In *Journal of Cleaner Production* (Vol. 325). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2021.129261>
2. Bandulahewa, B. K. M., & de Silva, R. K. J. (2020). Characterization of virtual prototyping in 'Refashion' to augment circular apparel industry. 2020 From Innovation to Impact, FITI 2020. <https://doi.org/10.1109/FITI52050.2020.9424872>
3. Bassett, N. (2020). Sustainable Fashion Through Circular Business Innovations: New Business Models Reduce Waste. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 287–294). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_16
4. Beyer, K., & Arnold, M. G. (2020). Circular Approaches and Business Model Innovations for Social Sustainability in the Textile Industry. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 341–373). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_19
5. Bressanelli, G., Visintin, F., & Saccani, N. (2022). Circular Economy and the evolution of industrial districts: a supply chain perspective. *International Journal of Production Economics*, 243. <https://doi.org/10.1016/j.ijpe.2021.108348>
6. Brydges, T. (2021). Closing the loop on take, make, waste: Investigating circular economy practices in the Swedish fashion industry. *Journal of Cleaner Production*, 293. <https://doi.org/10.1016/j.jclepro.2021.126245>
7. Camacho-Otero, J., Boks, C., & Pettersen, I. N. (2019). User acceptance and adoption of circular offerings in the fashion sector: Insights from user-generated online reviews. *Journal of Cleaner Production*, 231, 928–939. <https://doi.org/10.1016/j.jclepro.2019.05.162>
8. Christensen, T. B. (2021). Towards a circular economy in cities: Exploring local modes of governance in the transition towards a circular economy in construction and textile recycling. *Journal of Cleaner Production*, 305. <https://doi.org/10.1016/j.jclepro.2021.127058>

9. Claxton, S., & Kent, A. (2020). The management of sustainable fashion design strategies: An analysis of the designer's role. *Journal of Cleaner Production*, 268. <https://doi.org/10.1016/j.jclepro.2020.122112>
10. Clube, R. K. M., & Tennant, M. (2022). Social inclusion and the circular economy: The case of a fashion textiles manufacturer in Vietnam. *Business Strategy and Development*, 5(1), 4–16. <https://doi.org/10.1002/bsd2.179>
11. Colasante, A., & D'Adamo, I. (2021). The circular economy and bioeconomy in the fashion sector: Emergence of a “sustainability bias.” *Journal of Cleaner Production*, 329. <https://doi.org/10.1016/j.jclepro.2021.129774>
12. Colucci, M., & Vecchi, A. (2021). Close the loop: Evidence on the implementation of the circular economy from the Italian fashion industry. *Business Strategy and the Environment*, 30(2), 856–873. <https://doi.org/10.1002/bse.2658>
13. Cooper, T., & Claxton, S. (2022). Garment failure causes and solutions: Slowing the cycles for circular fashion. *Journal of Cleaner Production*, 351. <https://doi.org/10.1016/j.jclepro.2022.131394>
14. Corvellec, H., & Stål, H. I. (2019). Qualification as corporate activism: How Swedish apparel retailers attach circular fashion qualities to take-back systems. *Scandinavian Journal of Management*, 35(3). <https://doi.org/10.1016/j.scaman.2019.03.002>
15. de Oliveira Neto, G. C., Correia, J. M. F., Tucci, H. N. P., Librantz, A. F. H., Giannetti, B. F., & de Almeida, C. M. V. B. (2022). Sustainable Resilience Degree assessment of the textile industrial by size: Incremental change in cleaner production practices considering circular economy. *Journal of Cleaner Production*, 380. <https://doi.org/10.1016/j.jclepro.2022.134633>
16. Dos Santos, P. S., & Campos, L. M. de S. (2021). Practices for garment industry's post-consumer textile waste management in the circular economy context: An analysis on literature. In *Brazilian Journal of Operations and Production Management* (Vol. 18, Issue 1). Associacao Brasileira de Engenharia de Producao. <https://doi.org/10.14488/BJOPM.2021.004>
17. Elf, P., Werner, A., & Black, S. (2022). Advancing the circular economy through dynamic capabilities and extended customer engagement: Insights from small sustainable fashion enterprises in the UK. *Business Strategy and the Environment*, 31(6), 2682–2699. <https://doi.org/10.1002/bse.2999>

18. Farahmandpour, R., Karimi, K., Denayer, J. F. M., & Shafiei, M. (2022). Innovative biorefineries for cleaner waste textile management towards circular economy: Techno-economic analysis. *Journal of Cleaner Production*, 378. <https://doi.org/10.1016/j.jclepro.2022.134500>
19. Fidan, F., Aydoğan, E. K., & Uzal, N. (2021). An integrated life cycle assessment approach for denim fabric production using recycled cotton fibers and combined heat and power plant. *Journal of Cleaner Production*, 287. <https://doi.org/10.1016/j.jclepro.2020.125439>
20. Galatti, L. G., & Baruque-Ramos, J. (2022). Circular economy indicators for measuring social innovation in the Brazilian textile and fashion industry. *Journal of Cleaner Production*, 363. <https://doi.org/10.1016/j.jclepro.2022.132485>
21. Gil-Lamata, M., & Latorre-Martínez, M. P. (2022). The Circular Economy and Sustainability: A Systematic Literature Review. *Cuadernos de Gestion*, 22(1), 129–142. <https://doi.org/10.5295/CDG.211492MG>
22. Haegglblom, J., & Budde, I. (2020). Circular Design as a Key Driver for Sustainability in Fashion and Textiles. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 35–45). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_3
23. Hall, N., & Boiten, V. J. (2020). Circular Textiles: Building Business Case Scenarios Through Stakeholder Dialogue. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 377–402). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_20
24. Hildebrandt, J., Thrän, D., & Bezama, A. (2021). The circularity of potential bio-textile production routes: Comparing life cycle impacts of bio-based materials used within the manufacturing of selected leather substitutes. *Journal of Cleaner Production*, 287. <https://doi.org/10.1016/j.jclepro.2020.125470>
25. Holtström, J., Bjellerup, C., & Eriksson, J. (2019). Business model development for sustainable apparel consumption: The case of Houdini Sportswear. *Journal of Strategy and Management*, 12(4), 481–504. <https://doi.org/10.1108/JSMA-01-2019-0015>
26. Hur, E. (2020). Rebirth fashion: Secondhand clothing consumption values and perceived risks. *Journal of Cleaner Production*, 273. <https://doi.org/10.1016/j.jclepro.2020.122951>
27. Jain, G., Kamble, S. S., Ndubisi, N. O., Shrivastava, A., Belhadi, A., & Venkatesh, M. (2022). Antecedents of Blockchain-Enabled E-commerce Platforms (BEEP) adoption by

- customers – A study of second-hand small and medium apparel retailers. *Journal of Business Research*, 149, 576–588. <https://doi.org/10.1016/j.jbusres.2022.05.041>
28. Jayot, E. (2019). A Designer Contribution to the Use of CNC Machines Within the Supply Chain in Order to Extend Clothing Life Span. In *Technology-Driven Sustainability: Innovation in the Fashion Supply Chain* (pp. 27–55). Springer International Publishing. https://doi.org/10.1007/978-3-030-15483-7_3
29. Jia, F., Yin, S., Chen, L., & Chen, X. (2020). The circular economy in the textile and apparel industry: A systematic literature review. In *Journal of Cleaner Production* (Vol. 259). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2020.120728>
30. Kant Hvass, K., & Pedersen, E. R. G. (2019). Toward circular economy of fashion: Experiences from a brand's product take-back initiative. *Journal of Fashion Marketing and Management*, 23(3), 345–365. <https://doi.org/10.1108/JFMM-04-2018-0059>
31. Kayikci, Y., Kazancoglu, Y., Gozacan-Chase, N., Lafci, C., & Batista, L. (2022). Assessing smart circular supply chain readiness and maturity level of small and medium-sized enterprises. *Journal of Business Research*, 149, 375–392. <https://doi.org/10.1016/j.jbusres.2022.05.042>
32. Keh, E. (2020). New Paradigm for R&D and Business Model of Textile Circularity. In *An Introduction to Circular Economy* (pp. 325–347). Springer Singapore. https://doi.org/10.1007/978-981-15-8510-4_17
33. Khalili Nasr, A., Tavana, M., Alavi, B., & Mina, H. (2021). A novel fuzzy multi-objective circular supplier selection and order allocation model for sustainable closed-loop supply chains. *Journal of Cleaner Production*, 287. <https://doi.org/10.1016/j.jclepro.2020.124994>
34. Khitous, F., Urbinati, A., & Verleye, K. (2022). Product-Service Systems: A customer engagement perspective in the fashion industry. *Journal of Cleaner Production*, 336. <https://doi.org/10.1016/j.jclepro.2022.130394>
35. Ki, C. W., Chong, S. M., & Ha-Brookshire, J. E. (2020). How fashion can achieve sustainable development through a circular economy and stakeholder engagement: A systematic literature review. In *Corporate Social Responsibility and Environmental Management* (Vol. 27, Issue 6, pp. 2401–2424). John Wiley and Sons Ltd. <https://doi.org/10.1002/csr.1970>
36. Ki, C. W., Park, S., & Ha-Brookshire, J. E. (2021). Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in

- creating a circular fashion economy. *Business Strategy and the Environment*, 30(2), 1121–1135. <https://doi.org/10.1002/bse.2675>
37. Kim, N. (Lauren), Woo, H., & Ramkumar, B. (2021). The role of product history in consumer response to online second-hand clothing retail service based on circular fashion. *Journal of Retailing and Consumer Services*, 60. <https://doi.org/10.1016/j.jretconser.2021.102457>
38. Kim, T., Kim, D., & Park, Y. (2022). Recent progress in regenerated fibers for “green” textile products. In *Journal of Cleaner Production* (Vol. 376). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2022.134226>
39. Koszewska, M., Rahman, O., & Dyczewski, B. (2020). Circular Fashion - Consumers’ Attitudes in Cross-National Study: Poland and Canada. *Autex Research Journal*, 20(3), 327–337. <https://doi.org/10.2478/aut-2020-0029>
40. Kovacs, I. (2021). Perceptions and attitudes of generation z consumers towards sustainable clothing: Managerial implications based on a summative content analysis. *Polish Journal of Management Studies*, 23(1), 257–276. <https://doi.org/10.17512/pjms.2021.23.1.16>
41. Leal Filho, W., Ellams, D., Han, S., Tyler, D., Boiten, V. J., Paco, A., Moora, H., & Balogun, A. L. (2019). A review of the socio-economic advantages of textile recycling. In *Journal of Cleaner Production* (Vol. 218, pp. 10–20). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2019.01.210>
42. Luoma, P., Penttinen, E., Tapio, P., & Toppinen, A. (2022). Future images of data in circular economy for textiles. *Technological Forecasting and Social Change*, 182. <https://doi.org/10.1016/j.techfore.2022.121859>
43. Machado, M. A. D., Almeida, S. O. de, Bollick, L. C., & Bragagnolo, G. (2019). Second-hand fashion market: consumer role in circular economy. *Journal of Fashion Marketing and Management*, 23(3), 382–395. <https://doi.org/10.1108/JFMM-07-2018-0099>
44. Majumdar, A., Ali, S. M., Agrawal, R., & Srivastava, S. (2022). A triple helix framework for strategy development in circular textile and clothing supply chain: an Indian perspective. *Journal of Cleaner Production*, 367. <https://doi.org/10.1016/j.jclepro.2022.132954>
45. Maldini, I., Stappers, P. J., Gimeno-Martinez, J. C., & Daanen, H. A. M. (2019). Assessing the impact of design strategies on clothing lifetimes, usage and volumes: The case of product personalisation. *Journal of Cleaner Production*, 210, 1414–1424. <https://doi.org/10.1016/j.jclepro.2018.11.056>

46. Martina, R. A., & Oskam, I. F. (2021). Practical guidelines for designing recycling, collaborative, and scalable business models: A case study of reusing textile fibers into biocomposite products. *Journal of Cleaner Production*, 318. <https://doi.org/10.1016/j.jclepro.2021.128542>
47. Mihăiliasa, M., & Avasilcăi, S. (2020). Application of Circular Economy Principles in the Luxury Fashion Industry: The Case of the RealReal. *Springer Proceedings in Business and Economics*, 219–226. https://doi.org/10.1007/978-3-030-44711-3_16
48. Mishra, S., Jain, S., & Malhotra, G. (2020). The anatomy of circular economy transition in the fashion industry. *Social Responsibility Journal*, 17(4), 524–542. <https://doi.org/10.1108/SRJ-06-2019-0216>
49. Moreira da Silva, F. (2021). Sustainable Fashion is Ethical and Circular. In *Springer Series in Design and Innovation* (Vol. 9, pp. 299–309). Springer Nature. https://doi.org/10.1007/978-3-030-55700-3_21
50. Niinimäki, K., & Karell, E. (2019). Closing the Loop: Intentional Fashion Design Defined by Recycling Technologies. In *Technology-Driven Sustainability: Innovation in the Fashion Supply Chain* (pp. 7–25). Springer International Publishing. https://doi.org/10.1007/978-3-030-15483-7_2
51. Norris, L. (2019). Urban prototypes: Growing local circular cloth economies. *Business History*, 61(1), 205–224. <https://doi.org/10.1080/00076791.2017.1389902>
52. Oliveira Silva, W. D., & Morais, D. C. (2022). Impacts and insights of circular business models' outsourcing decisions on textile and fashion waste management: A multi-criteria decision model for sorting circular strategies. *Journal of Cleaner Production*, 370. <https://doi.org/10.1016/j.jclepro.2022.133551>
53. Ostermann, C. M., Nascimento, L. da S., Steinbruch, F. K., & Callegaro-de-Menezes, D. (2021). Drivers to implement the circular economy in born-sustainable business models: a case study in the fashion industry. *Revista de Gestao*, 28(3), 223–240. <https://doi.org/10.1108/REG-03-2020-0017>
54. Parker-Strak, R., Barnes, L., Studd, R., & Doyle, S. (2020). Disruptive product development for online fast fashion retailers. *Journal of Fashion Marketing and Management*, 24(3), 517–532. <https://doi.org/10.1108/JFMM-08-2019-0170>

55. Pedersen, E. R. G., Earley, R., & Andersen, K. R. (2019). From singular to plural: exploring organisational complexities and circular business model design. *Journal of Fashion Marketing and Management*, 23(3), 308–326. <https://doi.org/10.1108/JFMM-04-2018-0062>
56. Pluskal, J., Šomplák, R., Nevrlý, V., Smejkalová, V., & Pavlas, M. (2021). Strategic decisions leading to sustainable waste management: Separation, sorting and recycling possibilities. *Journal of Cleaner Production*, 278. <https://doi.org/10.1016/j.jclepro.2020.123359>
57. Provin, A. P., Dutra, A. R. de A., de Sousa e Silva Gouveia, I. C. A., & Cubas, e. A. L. V. (2021). Circular economy for fashion industry: Use of waste from the food industry for the production of biotextiles. *Technological Forecasting and Social Change*, 169. <https://doi.org/10.1016/j.techfore.2021.120858>
58. Rainville, D. A. (2021). Stimulating a more Circular Economy through Public Procurement: Roles and dynamics of intermediation. *Research Policy*, 50(4). <https://doi.org/10.1016/j.respol.2020.104193>
59. Ramkumar, B., Woo, H., & Kim, N. (2021). The cross-cultural effects of brand status and social facilitation on enhancing consumer perception toward circular fashion services. *Corporate Social Responsibility and Environmental Management*, 28(4), 1254–1269. <https://doi.org/10.1002/csr.2166>
60. Rese, A., Baier, D., & Rausch, T. M. (2022). Success factors in sustainable textile product innovation: An empirical investigation. *Journal of Cleaner Production*, 331. <https://doi.org/10.1016/j.jclepro.2021.129829>
61. Riba, J. R., Cantero, R., Canals, T., & Puig, R. (2020). Circular economy of post-consumer textile waste: Classification through infrared spectroscopy. *Journal of Cleaner Production*, 272. <https://doi.org/10.1016/j.jclepro.2020.123011>
62. Ribul, M., Lanot, A., Tommencioni Pisapia, C., Purnell, P., McQueen-Mason, S. J., & Baurley, S. (2021). Mechanical, chemical, biological: Moving towards closed-loop bio-based recycling in a circular economy of sustainable textiles. *Journal of Cleaner Production*, 326. <https://doi.org/10.1016/j.jclepro.2021.129325>
63. Rossi, E., Bertassini, A. C., Ferreira, C. dos S., Neves do Amaral, W. A., & Ometto, A. R. (2020). Circular economy indicators for organizations considering sustainability and business models: Plastic, textile and electro-electronic cases. *Journal of Cleaner Production*, 247. <https://doi.org/10.1016/j.jclepro.2019.119137>

64. Saha, K., Dey, P. K., & Papagiannaki, E. (2021). Implementing circular economy in the textile and clothing industry. *Business Strategy and the Environment*, 30(4), 1497–1530. <https://doi.org/10.1002/bse.2670>
65. Salah, F., Vololonirina, O., & Gidik, H. (2022). Development of fibrous materials applied in timber-framed construction using recycled fibers from textile waste. *Journal of Cleaner Production*, 347. <https://doi.org/10.1016/j.jclepro.2022.131203>
66. Salmi, A., & Kaipia, R. (2022). Implementing circular business models in the textile and clothing industry. *Journal of Cleaner Production*, 378. <https://doi.org/10.1016/j.jclepro.2022.134492>
67. Sandberg, E., & Hultberg, E. (2021). Dynamic capabilities for the scaling of circular business model initiatives in the fashion industry. *Journal of Cleaner Production*, 320. <https://doi.org/10.1016/j.jclepro.2021.128831>
68. Sandvik, I. M., & Stubbs, W. (2019). Circular fashion supply chain through textile-to-textile recycling. *Journal of Fashion Marketing and Management*, 23(3), 366–381. <https://doi.org/10.1108/JFMM-04-2018-0058>
69. Shou, M., & Domenech, T. (2022). Integrating LCA and blockchain technology to promote circular fashion – A case study of leather handbags. *Journal of Cleaner Production*, 373. <https://doi.org/10.1016/j.jclepro.2022.133557>
70. Shrivastava, A., Jain, G., Kamble, S. S., & Belhadi, A. (2021). Sustainability through online renting clothing: Circular fashion fueled by instagram micro-celebrities. *Journal of Cleaner Production*, 278. <https://doi.org/10.1016/j.jclepro.2020.123772>
71. Siderius, T., & Poldner, K. (2021). Reconsidering the Circular Economy Rebound effect: Propositions from a case study of the Dutch Circular Textile Valley. *Journal of Cleaner Production*, 293. <https://doi.org/10.1016/j.jclepro.2021.125996>
72. Stål, H. I., & Corvellec, H. (2022). Organizing Means–Ends Decoupling: Core–Compartment Separations in Fast Fashion. *Business and Society*, 61(4), 857–885. <https://doi.org/10.1177/00076503211001856>
73. Sugg, B. (2022). Circular textiles innovation during COVID-19: not the silver lining some had hoped for. *Journal of Fashion Marketing and Management*, 1–16. <https://doi.org/10.1108/JFMM-07-2021-0180>

74. Tang, W., Tang, B., Bai, W., Pakdel, E., Wang, J., & Wang, X. (2022). Porous, colorful and gas-adsorption powder from wool waste for textile functionalization. *Journal of Cleaner Production*, 366. <https://doi.org/10.1016/j.jclepro.2022.132805>
75. Tunn, V. S. C., Bocken, N. M. P., van den Hende, E. A., & Schoormans, J. P. L. (2019). Business models for sustainable consumption in the circular economy: An expert study. *Journal of Cleaner Production*, 212, 324–333. <https://doi.org/10.1016/j.jclepro.2018.11.290>
76. Tyler, D. J., & Han, S. L. C. (2019). Designing Products for the Circular Economy. In *Technology-Driven Sustainability: Innovation in the Fashion Supply Chain* (pp. 93–116). Springer International Publishing. https://doi.org/10.1007/978-3-030-15483-7_6
77. Vătămănescu, E. M., Dabija, D. C., Gazzola, P., Cegarro-Navarro, J. G., & Buzzi, T. (2021). Before and after the outbreak of Covid-19: Linking fashion companies' corporate social responsibility approach to consumers' demand for sustainable products. *Journal of Cleaner Production*, 321. <https://doi.org/10.1016/j.jclepro.2021.128945>
78. Wang, J., Jiang, J., Ding, J., Wang, X., Sun, Y., Ruan, R., Ragauskas, A. J., Ok, Y. S., & Tsang, D. C. W. (2021). Promoting Diels-Alder reactions to produce bio-BTX: Co-aromatization of textile waste and plastic waste over USY zeolite. *Journal of Cleaner Production*, 314. <https://doi.org/10.1016/j.jclepro.2021.127966>
79. Yousef, S., Tatariants, M., Tichonovas, M., Kliucininkas, L., Lukošiuūtė, S. I., & Yan, L. (2020). Sustainable green technology for recovery of cotton fibers and polyester from textile waste. *Journal of Cleaner Production*, 254. <https://doi.org/10.1016/j.jclepro.2020.120078>
80. Zhao, M., Zhou, Y., Meng, J., Zheng, H., Cai, Y., Shan, Y., Guan, D., & Yang, Z. (2021). Virtual carbon and water flows embodied in global fashion trade - a case study of denim products. *Journal of Cleaner Production*, 303. <https://doi.org/10.1016/j.jclepro.2021.127080>

6. Reference

- Abdelmeguid, A., Afy-Shararah, M., & Salonitis, K. (2022). Investigating the challenges of applying the principles of the circular economy in the fashion industry: A systematic review. In *Sustainable Production and Consumption* (Vol. 32, pp. 505–518). Elsevier B.V. <https://doi.org/10.1016/j.spc.2022.05.009>
- Angel, M., Subramanian, G., & Muthu, S. (n.d.). *Environmental Footprints and Eco-design of Products and Processes Sustainable Luxury Cases on Circular Economy and Entrepreneurship*. <http://www.springer.com/series/13340>
- Anne-Will Harzing. (2010). *The Publish or Perish Book*.
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Avadanei, M., Olaru, S., Ionescu, I., Florea, A., Curteza, A., Loghin, E. C., Dulgheriu, I., & Radu, D. C. (2021). Clothing development process towards a circular model. *Industria Textila*, 72(1), 89–96. <https://doi.org/10.35530/IT.072.01.1563B>
- Bandulahewa, B. K. M., & de Silva, R. K. J. (2020). Characterization of virtual prototyping in ‘Refashion’ to augment circular apparel industry. *2020 From Innovation to Impact, FITI 2020*. <https://doi.org/10.1109/FITI52050.2020.9424872>
- Bassett, N. (2020). Sustainable Fashion Through Circular Business Innovations: New Business Models Reduce Waste. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 287–294). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_16
- Beyer, K., & Arnold, M. G. (2020). Circular Approaches and Business Model Innovations for Social Sustainability in the Textile Industry. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 341–373). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_19
- Bressanelli, G., Visintin, F., & Saccani, N. (2022). Circular Economy and the evolution of industrial districts: a supply chain perspective. *International Journal of Production Economics*, 243. <https://doi.org/10.1016/j.ijpe.2021.108348>

- Brydges, T. (2021). Closing the loop on take, make, waste: Investigating circular economy practices in the Swedish fashion industry. *Journal of Cleaner Production*, 293. <https://doi.org/10.1016/j.jclepro.2021.126245>
- Christensen, T. B. (2021). Towards a circular economy in cities: Exploring local modes of governance in the transition towards a circular economy in construction and textile recycling. *Journal of Cleaner Production*, 305. <https://doi.org/10.1016/j.jclepro.2021.127058>
- Claxton, S., & Kent, A. (2020). The management of sustainable fashion design strategies: An analysis of the designer's role. *Journal of Cleaner Production*, 268. <https://doi.org/10.1016/j.jclepro.2020.122112>
- Colasante, A., & D'Adamo, I. (2021). The circular economy and bioeconomy in the fashion sector: Emergence of a "sustainability bias." *Journal of Cleaner Production*, 329. <https://doi.org/10.1016/j.jclepro.2021.129774>
- Cooper, T., & Claxton, S. (2022). Garment failure causes and solutions: Slowing the cycles for circular fashion. *Journal of Cleaner Production*, 351. <https://doi.org/10.1016/j.jclepro.2022.131394>
- Corvellec, H., & Stål, H. I. (2019). Qualification as corporate activism: How Swedish apparel retailers attach circular fashion qualities to take-back systems. *Scandinavian Journal of Management*, 35(3). <https://doi.org/10.1016/j.scaman.2019.03.002>
- de Oliveira Neto, G. C., Correia, J. M. F., Tucci, H. N. P., Librantz, A. F. H., Giannetti, B. F., & de Almeida, C. M. V. B. (2022). Sustainable Resilience Degree assessment of the textile industrial by size: Incremental change in cleaner production practices considering circular economy. *Journal of Cleaner Production*, 380. <https://doi.org/10.1016/j.jclepro.2022.134633>
- Dos Santos, P. S., & Campos, L. M. de S. (2021). Practices for garment industry's post-consumer textile waste management in the circular economy context: An analysis on literature. In *Brazilian Journal of Operations and Production Management* (Vol. 18, Issue 1). Associacao Brasileira de Engenharia de Producao. <https://doi.org/10.14488/BJOPM.2021.004>
- Elf, P., Werner, A., & Black, S. (2022). Advancing the circular economy through dynamic capabilities and extended customer engagement: Insights from small sustainable fashion

- enterprises in the UK. *Business Strategy and the Environment*, 31(6), 2682–2699. <https://doi.org/10.1002/bse.2999>
- Ellen MacArthur Foundation. (2013).
- Ellen MacArthur Foundation. (2017). *A new textiles economy: Redesigning fashion's future*. <http://www.ellenmacarthurfoundation.org/publications>
- Eugene Garfield, & Irving H. Sher. (1993). *KeyWords PlusTMAAlgorithmic Derivative Indexing*.
- European Commission. (2020). *Circular economy action plan*. https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en
- European Parliament. (2023). *Circular economy: definition, importance and benefits*.
- Fidan, F., Aydoğan, E. K., & Uzal, N. (2021). An integrated life cycle assessment approach for denim fabric production using recycled cotton fibers and combined heat and power plant. *Journal of Cleaner Production*, 287. <https://doi.org/10.1016/j.jclepro.2020.125439>
- Haegglblom, J., & Budde, I. (2020). Circular Design as a Key Driver for Sustainability in Fashion and Textiles. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 35–45). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_3
- Hall, N., & Boiten, V. J. (2020). Circular Textiles: Building Business Case Scenarios Through Stakeholder Dialogue. In *Sustainable Textile and Fashion Value Chains: Drivers, Concepts, Theories and Solutions* (pp. 377–402). Springer International Publishing. https://doi.org/10.1007/978-3-030-22018-1_20
- Hirscher, A. L., Niinimäki, K., & Joyner Armstrong, C. M. (2018). Social manufacturing in the fashion sector: New value creation through alternative design strategies? *Journal of Cleaner Production*, 172, 4544–4554. <https://doi.org/10.1016/j.jclepro.2017.11.020>
- Hugo, A. de A., de Nadae, J., & Lima, R. da S. (2021). Can fashion be circular? A literature review on circular economy barriers, drivers, and practices in the fashion industry's productive chain. In *Sustainability (Switzerland)* (Vol. 13, Issue 21). MDPI. <https://doi.org/10.3390/su132112246>

- Jia, F., Yin, S., Chen, L., & Chen, X. (2020). The circular economy in the textile and apparel industry: A systematic literature review. In *Journal of Cleaner Production* (Vol. 259). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2020.120728>
- journalsearches. (2023). *Knitting International impact factor, indexing, ranking (2023)*. <https://journalsearches.com/journal.php?title=Knitting%20International#:~:text=Knitting%20International%20is%20a%20research,of%20this%20journal%20is%202668394>.
- Kant Hvass, K., & Pedersen, E. R. G. (2019). Toward circular economy of fashion: Experiences from a brand's product take-back initiative. *Journal of Fashion Marketing and Management*, 23(3), 345–365. <https://doi.org/10.1108/JFMM-04-2018-0059>
- Keh, E. (2020). New Paradigm for R&D and Business Model of Textile Circularity. In *An Introduction to Circular Economy* (pp. 325–347). Springer Singapore. https://doi.org/10.1007/978-981-15-8510-4_17
- Khalili Nasr, A., Tavana, M., Alavi, B., & Mina, H. (2021). A novel fuzzy multi-objective circular supplier selection and order allocation model for sustainable closed-loop supply chains. *Journal of Cleaner Production*, 287. <https://doi.org/10.1016/j.jclepro.2020.124994>
- Khitous, F., Urbinati, A., & Verleye, K. (2022). Product-Service Systems: A customer engagement perspective in the fashion industry. *Journal of Cleaner Production*, 336. <https://doi.org/10.1016/j.jclepro.2022.130394>
- Ki, C. W., Chong, S. M., & Ha-Brookshire, J. E. (2020). How fashion can achieve sustainable development through a circular economy and stakeholder engagement: A systematic literature review. In *Corporate Social Responsibility and Environmental Management* (Vol. 27, Issue 6, pp. 2401–2424). John Wiley and Sons Ltd. <https://doi.org/10.1002/csr.1970>
- Ki, C. W., Park, S., & Ha-Brookshire, J. E. (2021). Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in creating a circular fashion economy. *Business Strategy and the Environment*, 30(2), 1121–1135. <https://doi.org/10.1002/bse.2675>
- Kim, N. (Lauren), Woo, H., & Ramkumar, B. (2021). The role of product history in consumer response to online second-hand clothing retail service based on circular fashion. *Journal of Retailing and Consumer Services*, 60. <https://doi.org/10.1016/j.jretconser.2021.102457>

- Kim, T., Kim, D., & Park, Y. (2022). Recent progress in regenerated fibers for “green” textile products. In *Journal of Cleaner Production* (Vol. 376). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2022.134226>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. In *Resources, Conservation and Recycling* (Vol. 127, pp. 221–232). Elsevier B.V. <https://doi.org/10.1016/j.resconrec.2017.09.005>
- Koszewska, M., Rahman, O., & Dyczewski, B. (2020). Circular Fashion - Consumers’ Attitudes in Cross-National Study: Poland and Canada. *Autex Research Journal*, 20(3), 327–337. <https://doi.org/10.2478/aut-2020-0029>
- Leal Filho, W., Ellams, D., Han, S., Tyler, D., Boiten, V. J., Paco, A., Moora, H., & Balogun, A. L. (2019). A review of the socio-economic advantages of textile recycling. In *Journal of Cleaner Production* (Vol. 218, pp. 10–20). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2019.01.210>
- Luoma, P., Penttinen, E., Tapio, P., & Toppinen, A. (2022). Future images of data in circular economy for textiles. *Technological Forecasting and Social Change*, 182. <https://doi.org/10.1016/j.techfore.2022.121859>
- Machado, M. A. D., Almeida, S. O. de, Bollick, L. C., & Bragagnolo, G. (2019). Second-hand fashion market: consumer role in circular economy. *Journal of Fashion Marketing and Management*, 23(3), 382–395. <https://doi.org/10.1108/JFMM-07-2018-0099>
- Majumdar, A., Ali, S. M., Agrawal, R., & Srivastava, S. (2022). A triple helix framework for strategy development in circular textile and clothing supply chain: an Indian perspective. *Journal of Cleaner Production*, 367. <https://doi.org/10.1016/j.jclepro.2022.132954>
- Maldini, I., Stappers, P. J., Gimeno-Martinez, J. C., & Daanen, H. A. M. (2019). Assessing the impact of design strategies on clothing lifetimes, usage and volumes: The case of product personalisation. *Journal of Cleaner Production*, 210, 1414–1424. <https://doi.org/10.1016/j.jclepro.2018.11.056>
- Marjaei, S., Yazdi, F. A., & Chandrashekara, M. (2019). *MAXQDA and its Application to LIS Research*.

- Martina, R. A., & Oskam, I. F. (2021). Practical guidelines for designing recycling, collaborative, and scalable business models: A case study of reusing textile fibers into biocomposite products. *Journal of Cleaner Production*, 318. <https://doi.org/10.1016/j.jclepro.2021.128542>
- Merli, R., Preziosi, M., & Acampora, A. (2018). How do scholars approach the circular economy? A systematic literature review. In *Journal of Cleaner Production* (Vol. 178, pp. 703–722). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2017.12.112>
- Mishra, S., Jain, S., & Malhotra, G. (2020). The anatomy of circular economy transition in the fashion industry. *Social Responsibility Journal*, 17(4), 524–542. <https://doi.org/10.1108/SRJ-06-2019-0216>
- Moreira da Silva, F. (2021). Sustainable Fashion is Ethical and Circular. In *Springer Series in Design and Innovation* (Vol. 9, pp. 299–309). Springer Nature. https://doi.org/10.1007/978-3-030-55700-3_21
- Niinimäki, K., & Karell, E. (2019). Closing the Loop: Intentional Fashion Design Defined by Recycling Technologies. In *Technology-Driven Sustainability: Innovation in the Fashion Supply Chain* (pp. 7–25). Springer International Publishing. https://doi.org/10.1007/978-3-030-15483-7_2
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. In *The BMJ* (Vol. 372). BMJ Publishing Group. <https://doi.org/10.1136/bmj.n71>
- Parker-Strak, R., Barnes, L., Studd, R., & Doyle, S. (2020). Disruptive product development for online fast fashion retailers. *Journal of Fashion Marketing and Management*, 24(3), 517–532. <https://doi.org/10.1108/JFMM-08-2019-0170>
- Pluskal, J., Šomplák, R., Nevrlý, V., Smejkalová, V., & Pavlas, M. (2021). Strategic decisions leading to sustainable waste management: Separation, sorting and recycling possibilities. *Journal of Cleaner Production*, 278. <https://doi.org/10.1016/j.jclepro.2020.123359>

- Provin, A. P., Dutra, A. R. de A., de Sousa e Silva Gouveia, I. C. A., & Cubas, e. A. L. V. (2021). Circular economy for fashion industry: Use of waste from the food industry for the production of biotextiles. *Technological Forecasting and Social Change*, 169. <https://doi.org/10.1016/j.techfore.2021.120858>
- Rainville, D. A. (2021). Stimulating a more Circular Economy through Public Procurement: Roles and dynamics of intermediation. *Research Policy*, 50(4). <https://doi.org/10.1016/j.respol.2020.104193>
- Ramkumar, B., Woo, H., & Kim, N. (2021). The cross-cultural effects of brand status and social facilitation on enhancing consumer perception toward circular fashion services. *Corporate Social Responsibility and Environmental Management*, 28(4), 1254–1269. <https://doi.org/10.1002/csr.2166>
- Ribul, M., Lanot, A., Tommencioni Pisapia, C., Purnell, P., McQueen-Mason, S. J., & Baurley, S. (2021). Mechanical, chemical, biological: Moving towards closed-loop bio-based recycling in a circular economy of sustainable textiles. *Journal of Cleaner Production*, 326. <https://doi.org/10.1016/j.jclepro.2021.129325>
- Rossi, E., Bertassini, A. C., Ferreira, C. dos S., Neves do Amaral, W. A., & Ometto, A. R. (2020). Circular economy indicators for organizations considering sustainability and business models: Plastic, textile and electro-electronic cases. *Journal of Cleaner Production*, 247. <https://doi.org/10.1016/j.jclepro.2019.119137>
- Saha, K., Dey, P. K., & Papagiannaki, E. (2021). Implementing circular economy in the textile and clothing industry. *Business Strategy and the Environment*, 30(4), 1497–1530. <https://doi.org/10.1002/bse.2670>
- Salah, F., Vololonirina, O., & Gidik, H. (2022). Development of fibrous materials applied in timber-framed construction using recycled fibers from textile waste. *Journal of Cleaner Production*, 347. <https://doi.org/10.1016/j.jclepro.2022.131203>
- Salmi, A., & Kaipia, R. (2022). Implementing circular business models in the textile and clothing industry. *Journal of Cleaner Production*, 378. <https://doi.org/10.1016/j.jclepro.2022.134492>

- Sandberg, E., & Hultberg, E. (2021). Dynamic capabilities for the scaling of circular business model initiatives in the fashion industry. *Journal of Cleaner Production*, 320. <https://doi.org/10.1016/j.jclepro.2021.128831>
- Sandin, G., & Peters, G. M. (2018). Environmental impact of textile reuse and recycling – A review. In *Journal of Cleaner Production* (Vol. 184, pp. 353–365). Elsevier Ltd. <https://doi.org/10.1016/j.jclepro.2018.02.266>
- Sandvik, I. M., & Stubbs, W. (2019). Circular fashion supply chain through textile-to-textile recycling. *Journal of Fashion Marketing and Management*, 23(3), 366–381. <https://doi.org/10.1108/JFMM-04-2018-0058>
- Sariatli, F. (2017). Linear Economy Versus Circular Economy: A Comparative and Analyzer Study for Optimization of Economy for Sustainability. *Visegrad Journal on Bioeconomy and Sustainable Development*, 6(1), 31–34. <https://doi.org/10.1515/vjbsd-2017-0005>
- ScienceDirect. (n.d.). *Journal of Cleaner Production*. Retrieved November 3, 2023, from <https://www.sciencedirect.com/journal/journal-of-cleaner-production>
- Shrivastava, A., Jain, G., Kamble, S. S., & Belhadi, A. (2021). Sustainability through online renting clothing: Circular fashion fueled by instagram micro-celebrities. *Journal of Cleaner Production*, 278. <https://doi.org/10.1016/j.jclepro.2020.123772>
- Stål, H. I., & Corvellec, H. (2022). Organizing Means–Ends Decoupling: Core–Compartment Separations in Fast Fashion. *Business and Society*, 61(4), 857–885. <https://doi.org/10.1177/00076503211001856>
- Sugg, B. (2022). Circular textiles innovation during COVID-19: not the silver lining some had hoped for. *Journal of Fashion Marketing and Management*, 1–16. <https://doi.org/10.1108/JFMM-07-2021-0180>
- Tang, W., Tang, B., Bai, W., Pakdel, E., Wang, J., & Wang, X. (2022). Porous, colorful and gas-adsorption powder from wool waste for textile functionalization. *Journal of Cleaner Production*, 366. <https://doi.org/10.1016/j.jclepro.2022.132805>
- Tunn, V. S. C., Bocken, N. M. P., van den Hende, E. A., & Schoormans, J. P. L. (2019). Business models for sustainable consumption in the circular economy: An expert study. *Journal of Cleaner Production*, 212, 324–333. <https://doi.org/10.1016/j.jclepro.2018.11.290>

- Tyler, D. J., & Han, S. L. C. (2019). Designing Products for the Circular Economy. In *Technology-Driven Sustainability: Innovation in the Fashion Supply Chain* (pp. 93–116). Springer International Publishing. https://doi.org/10.1007/978-3-030-15483-7_6
- UN News. (2019). *Climate and Environment*. <https://news.un.org/en/story/2019/03/1035161>
- Urbinati, A., Chiaroni, D., & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. *Journal of Cleaner Production*, 168, 487–498. <https://doi.org/10.1016/j.jclepro.2017.09.047>
- Vătămănescu, E. M., Dabija, D. C., Gazzola, P., Cegarro-Navarro, J. G., & Buzzi, T. (2021). Before and after the outbreak of Covid-19: Linking fashion companies' corporate social responsibility approach to consumers' demand for sustainable products. *Journal of Cleaner Production*, 321. <https://doi.org/10.1016/j.jclepro.2021.128945>
- Wang, J., Jiang, J., Ding, J., Wang, X., Sun, Y., Ruan, R., Ragauskas, A. J., Ok, Y. S., & Tsang, D. C. W. (2021). Promoting Diels-Alder reactions to produce bio-BTX: Co-aromatization of textile waste and plastic waste over USY zeolite. *Journal of Cleaner Production*, 314. <https://doi.org/10.1016/j.jclepro.2021.127966>
- Wautelet, T. (2018). *The Concept of Circular Economy: its Origins and its Evolution*. <https://doi.org/10.13140/RG.2.2.17021.87523>
- Williams, E. S., Panko, J., & Paustenbach, D. J. (2009). The European Union's REACH regulation: A review of its history and requirements the EU REACH regulation: A review E. S. Williams et al. In *Critical Reviews in Toxicology* (Vol. 39, Issue 7, pp. 553–575). <https://doi.org/10.1080/10408440903036056>
- Yousef, S., Tatariants, M., Tichonovas, M., Kliucininkas, L., Lukošiuūtė, S. I., & Yan, L. (2020). Sustainable green technology for recovery of cotton fibers and polyester from textile waste. *Journal of Cleaner Production*, 254. <https://doi.org/10.1016/j.jclepro.2020.120078>
- Zhang, J., Yu, Q., Zheng, F., Long, C., Lu, Z., & Duan, Z. (2016). Comparing keywords plus of WOS and author keywords: A case study of patient adherence research. *Journal of the Association for Information Science and Technology*, 67(4), 967–972. <https://doi.org/10.1002/asi.23437>

Zhao, M., Zhou, Y., Meng, J., Zheng, H., Cai, Y., Shan, Y., Guan, D., & Yang, Z. (2021). Virtual carbon and water flows embodied in global fashion trade - a case study of denim products. *Journal of Cleaner Production*, 303. <https://doi.org/10.1016/j.jclepro.2021.127080>