

Growth, Environmental Sustainability and Inclusivity in Textile Industry: A Systematic Literature Review

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Abstract

The textile industry has a significant impact on the global economy, particularly in terms of traditional production and processing methods. From the production of raw materials to the delivery of high-value-added goods, the textile industry encompasses a broad range of activities. The present study provides a systematic literature review of the performance of the textile industry, utilising 487 papers listed in the Scopus database. Biblioshiny and R were used to review the publications. Apart from pointing out possible study directions in this field, papers were checked for author contributions, citation counts, eminent scientific publications, keywords, academic ties, and associations. Based on the annual publication count, the evidence shows that China, the United States, and India rank as the top three countries. With 2,509 references, the most often published journal in the textile industry research is the International Journal of Production Economics. The most frequent keywords are 'performance', 'textile', and 'industry'. The paper concludes with policy implications that emphasise global collaboration, adoption of green technologies, and support for small and medium-sized enterprises. Policy implications emphasise the adoption of green technologies, circular economy principles, and inclusive development strategies, particularly focusing on small and medium-sized enterprises (SMEs). This study contributes to a deeper understanding of the textile industry's performance. It also provides directions for future research that balance growth, environmental responsibility, and inclusivity.

Keywords: Bibliometric Analysis, Research Trends, Sustainable Textiles, Systematic Literature Review, Textile Industry.

Introduction

Textiles represent the second most essential human necessity after food, making their study significant in daily life (1). The use of textiles dates back to the Stone Age, serving not only as a basic need but also as an indicator of socioeconomic status, gender, and cultural traditions (2). As one of the oldest industries, the textile industry has made substantial contributions to a country's export revenues. Its efficiency has gradually improved, particularly following the removal of the Multi-Fibre Arrangement in 2005 (3). This industry is highly dynamic and innovation-driven, characterised by skilled labour, making it both labour-intensive and cost-effective (4). It encompasses a broad spectrum of activities, from capital-intensive textile mills to hand-woven fabric production (5). Although the industry has experienced significant advancements over the past decade, it continues to face challenges in the

global market (6). The textile sector's performance is significantly influenced by evolving consumer preferences and environmental factors. A key challenge for businesses in this industry is the integration of new technologies and their strategic implications (7). The Fourth Industrial Revolution is expected to enable fully autonomous and intelligent manufacturing systems. It can be demonstrated by the adoption of cyber-physical systems and emerging digital capabilities (8).

Recent bibliometric studies utilising Cite Space have explored various themes in textile research, including protective clothing, smart textiles, and the environmental footprint of textile and clothing production (9–11). VOSviewer was used to analyse research trends in artificial intelligence applications within the textile industry (2).

The textile industry spans a vast range of activities, from the production of raw materials such as

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cotton, jute, silk, and wool to the development of high-value-added products like fabrics, furniture, and apparel. Alongside natural fibres, synthetic fibres, including polyester, viscose, acrylic, and various fibre blends, are widely utilised (12). In many developing economies, the textile sector is primarily composed of small-scale enterprises operating across the value chain, from raw material processing to the production of finished garments. Figure 1 provides a visual representation of the industry's value chain, illustrating its complexity and the need for an in-depth analysis of its various dimensions.

Prior studies have predominantly focused on specific dimensions of textile performance, including efficiency, environmental conservation, and trade dynamics. However, there are also discrepancies in the studies, such as whether an increase in exports always leads to better sustainability results or whether adopting new technologies makes things more inclusive. This

study contributes to the conversation by bringing together these diverse perspectives and advancing the discussion toward a more comprehensive understanding of growth, sustainability, and inclusivity in the textile sector.

This study contributes to the existing body of knowledge by analysing the latest research trends in the textile industry using a metadata-analysis approach. A total of 487 documents were retrieved from the Scopus database using the keywords "performance" and "textile industry" in the title, abstract, and keywords fields. The search covered publications from 1976 to February 6, 2025. The present study aims to address research objectives: to trace the evolution of textile research up to 2025; to identify the most influential journals, papers, and authors; to analyse the thematic and conceptual structure of the field; and to highlight contradictions and gaps in the literature to propose future research directions.

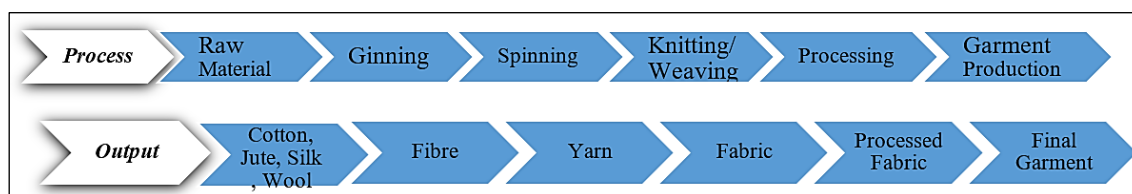


Figure 1: Value Chain of the Textile Industry

The diagram in Figure 1, illustrates the sequential process from raw materials (cotton, jute, silk, wool) through ginning, spinning, knitting/weaving, and processing, culminating in garment production as the final output.

Data and Search Strategy

Researchers conduct systematic literature reviews to examine the evolution of research in certain domains, identify knowledge gaps, and establish study objectives for future studies (13). To suggest improvements or the evolution of some fields of study, reviewing current theoretical and research frameworks is done through framework-based assessments (14). Bibliometric research is a quantitative method for assessing the literature and intellectual background of a particular topic. It applies statistical instruments to evaluate the patterns of citation, the trends in publishing, and the networks of collaboration among researchers, institutions, and nations. It is relevant in many

fields to identify gaps in the literature, assess the impact of research efforts, and discover trends in research activities (15). Usually, this approach focuses on data collected from scholarly databases such as Scopus, Web of Science, or PubMed. Important measurements are the number of publications, references, h-index, and co-authorship (16). Theme-based assessments are also conducted to assess the advancement of particular research themes and draw attention to the deficiencies to argue for future courses of study (17). The researcher selected the items for the analysis using the inclusion and exclusion rules (13). Only academic works indexed in the Scopus database and published in peer-reviewed journals are included in the study. After establishing the eligibility criteria for selecting articles, we employed a three-step process to identify relevant studies: document identification, screening, and final inclusion (Figure 2).

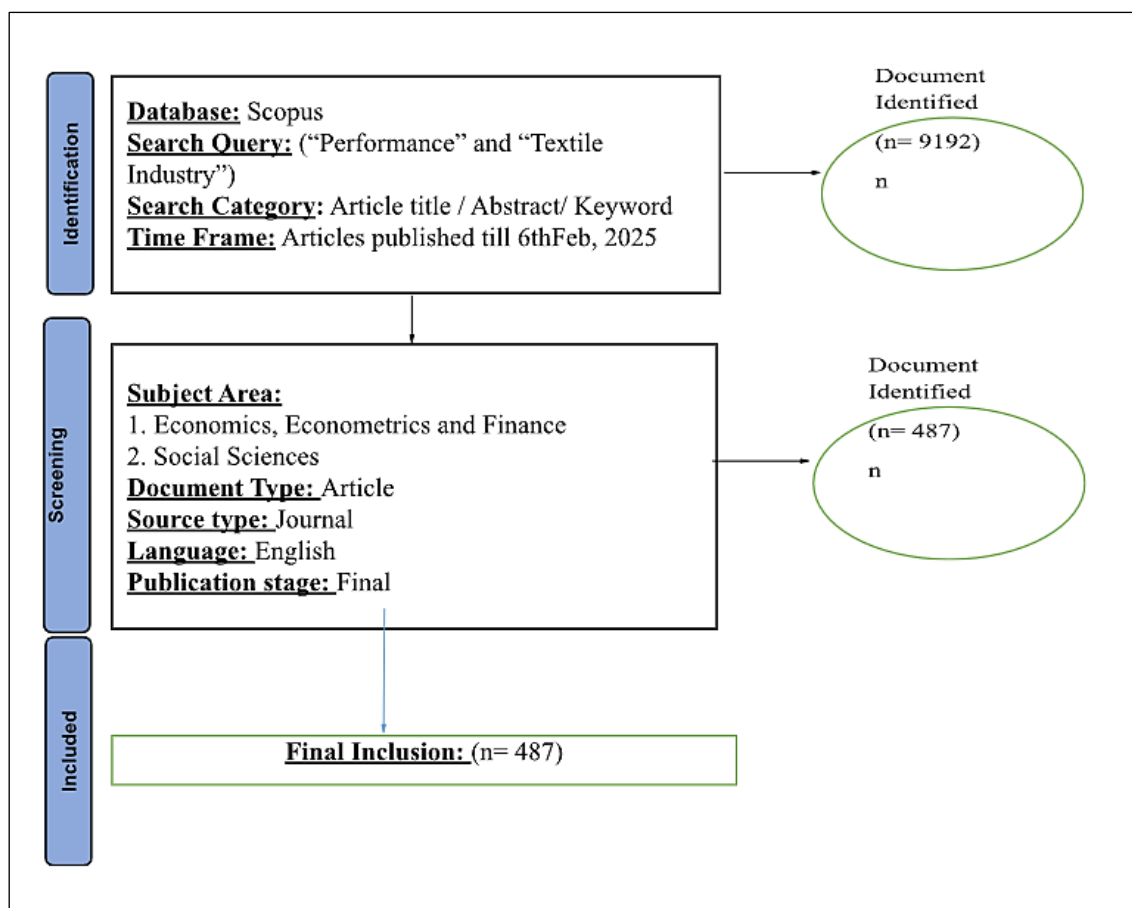


Figure 2. Article Sourcing and Selection Criteria

The flow diagram in Figure 2 shows the process of identifying and screening articles from Scopus using defined queries, subject areas, and filters, leading to the final inclusion of 487 articles in the systematic literature review.

Identification

The researcher investigated the Scopus bibliometric database to investigate and compile study subjects regarding the state of the textile industry. Searching was under the words "performance" and "textile industry". Overall, the search query linked to the performance of textile industry research returned (n = 9192) papers. Therefore, there is a greater chance that some papers will not be relevant for the research. Thus, extra screening using the appropriate filters was conducted on all of these papers.

Screening

The researchers have attempted to make sure the study solely consists of relevant papers by applying several filters. At first, the researcher limited their search to publications in the fields of "economics, econometrics, and finance" and "social sciences". In addition, the records only feature

"Journal articles" that have been "finally" published in "English" in their "final" form are considered. The search turned up 487 documents in all.

Final Inclusion

The inclusion criteria are restricted to peer-reviewed journal articles published in English and indexed in Scopus. Conference papers, book chapters, and studies not written in English are excluded from the study. Following comprehensive screening searches, the author has found 487 papers relevant to the body of knowledge on the performance of textile industry research. We also randomly went over these records to see if they would be relevant to the research. We found that all 487 of the documents were rather relevant to the topic. We thus finally included them in the study.

Bibliometric Overview of the Textile Literature

In the context of bibliometric analysis, various software applications are utilised by researchers. This study employs CiteSpace, Publish or Perish, BibExcel, Pajek, Gephi, and Biblioshiny for data

analysis. A conceptual framework is also created for theoretical foundations. Figure 3 shows that it links the three main areas of textile research: growth, environmental sustainability, and inclusion. The framework shows how economic growth creates industrial opportunities, which

then affect practices for sustainability and outcomes for inclusivity. The interplay among these pillars offers a theoretical foundation for evaluating both synergies and trade-offs within the industry.

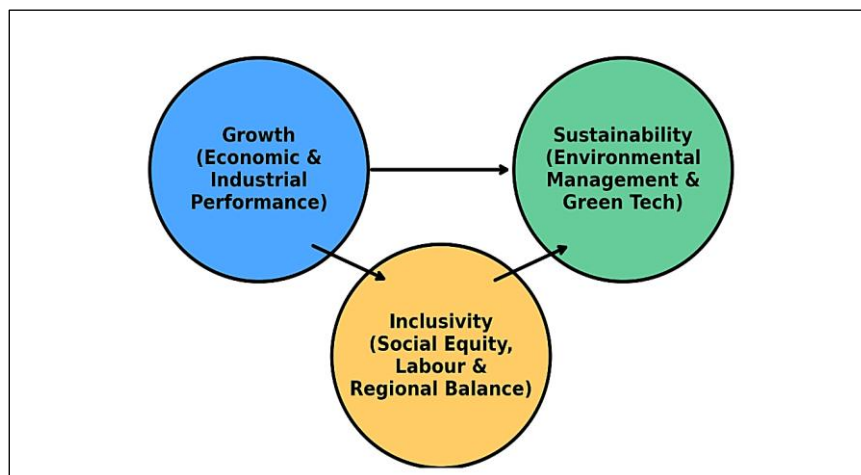


Figure 3: Conceptual Framework Linking Growth, Environmental Sustainability, and Inclusivity in the Textile Industry

A total of 487 publications underwent bibliometric analysis, and the results were presented accordingly. A summary of trends related to the performance of the textile industry, based on all studies published up to February 6, 2025, is presented first. Subsequently, we present the seminal studies that have garnered the highest number of citations within this domain. Thirdly, we present findings concerning the most effective and significant journals. The findings regarding the most effective and significant authors who have contributed to the advancement of research in the textile industry are presented in conclusion.

Descriptive Analysis

Table 1 shows basic details of the selected 487 articles. The articles' time frame runs from 1976 to 2025. The keywords associated with these papers are 1605. A total of 1360 authors in all have participated in this phenomenon of interest. Apart from 99 single-authored papers, all of the papers have been submitted with at least two authors. The most frequent keywords are performance, textile and industry (Figure 4).

Topic Modelling Using Latent Dirichlet Allocation (LDA)

The five terms with the highest beta values (β) for the four extracted subjects are presented in Figure 5. The β value indicates the probability that a term

will appear in a given topic ($P(\text{term} | \text{topic})$). The term is more important within the topic when its value is higher. The first topic includes industry, performance, textile, apparel, and approach. This topic emphasises the performance and structural aspects of the textile industry, with a particular emphasis on apparel and sectoral approaches. The dominance of terms like industry and performance suggests an analytical focus on overall industrial growth and competitiveness. The second theme is textile, industry, performance, study, and manufacturing. This issue primarily focuses on production processes, industrial performance, and empirical studies within the textile sector, with manufacturing indicating attention to the production side. Topic 3 consists of performance, textile, industry, manufacturing, and supply. This part focuses on manufacturing efficiency and supply-related issues in the textile industry, reflecting concerns with productivity, resource utilisation, and supply chain management. The fourth topic includes industry, performance, industries, analysis, and sustainability. This cluster connects industrial performance with sustainability and analytical approaches, indicating a research strand focused on sustainable practices and sectoral evaluations. Each topic was chosen based on the co-occurrence patterns of phrases across the papers, with

dominating terms providing major labels for interpretation. Terms such as industry and textile frequently appear across several domains,

reflecting their significant relevance in the study field and the overlapping nature of LDA topic modelling.

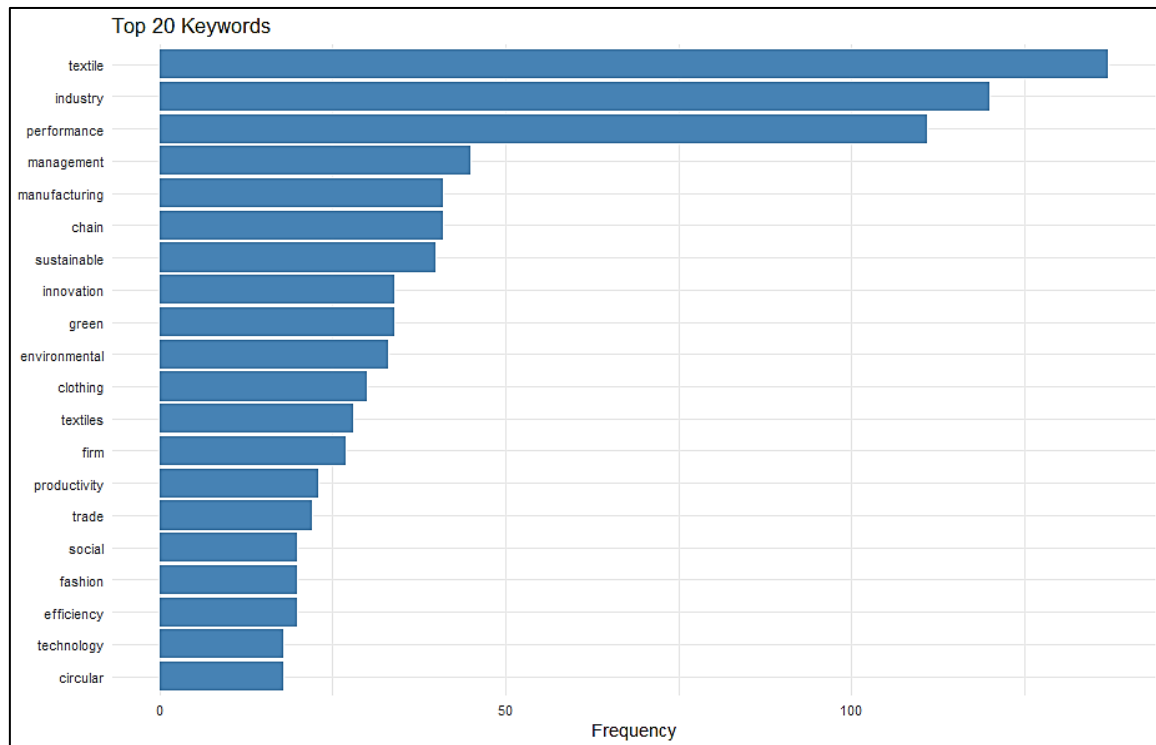


Figure 4: Top 20 Keywords in Textile Industry Research

The bar chart presents the most frequently occurring keywords in the analysed publications, highlighting “performance,” “textile,” and “industry” as the dominant research terms.

Publication Trends

After 2014, the publications and references of the papers on textile research (Figures 6 and 7) have improved. Despite this, the average yearly publication count stayed in the single-digit range at 4.05, or 487 papers released between 1976 and February 6, 2025. Intriguingly, from 2014 to April 2024, 28.8 papers annually on average accounted for 317 of 487 publications on the textile industry. It shows that study on the textile industry has expanded exponentially over this period.

Top Cited Articles

A compilation of the most frequently cited research papers was conducted. An article with a minimum of 100 citations is considered for the study. This selection is based on the benchmark established by a study (13). In total, 23 papers met the specified criteria. Table 2 highlights the most widely referenced studies in textile industry research.

Among the top five most-cited papers is a study, published in the *International Journal of Production Economics*, which has accumulated 858 citations, averaging 143 citations per year (18). This is followed by the work of a study, also published in the *International Journal of Production Economics*, with a total of 382 citations and an annual average of 31.83 citations (19). Other highly cited papers include studies (20), published in *Resources, Conservation, and Recycling*, with 336 citations (14.6 per year) (21), featured in the *International Journal of Production Economics*, with 278 citations (23.17 per year) (22), also published in the *International Journal of Production Economics*, with 192 citations and an annual citation rate of 13.71.

Productive Journals

487 papers about the textile industry have been published in 269 publications. The authors looked at journals with at least one publication and at least 100 citations to create a list of the most powerful and prolific journals that have progressed in the textile industry. Consequently, we came upon 20 journals in all that fit these requirements (Table 3). The journal with more citations is ranked

higher than the journal with less citations. Similarly, a journal with more articles is ranked better than one with fewer publications. When two or more journals have the same number of publications, the one with the most citations is rated higher. The top three most productive

journals are the International Journal of Production Economics, Sustainability (Switzerland), and Annals of Resources Conservation and Recycling, according to the findings.

Table 1: Main Bibliometric Information Regarding Selected Articles

Description	Results
Timespan	1976:2025
Sources (Journals, Books, etc)	269
Documents	487
Annual Growth Rate %	4.05
Document Average Age	10.1
Average citations per doc	23.25
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	2271
Author's Keywords (DE)	1605
AUTHORS	
Authors	1360
Authors of single-authored docs	96
AUTHORS COLLABORATION	
Single-authored docs	99
Co-Authors per Doc	3.01
International co-authorships %	25.46
DOCUMENT TYPES	
article	487

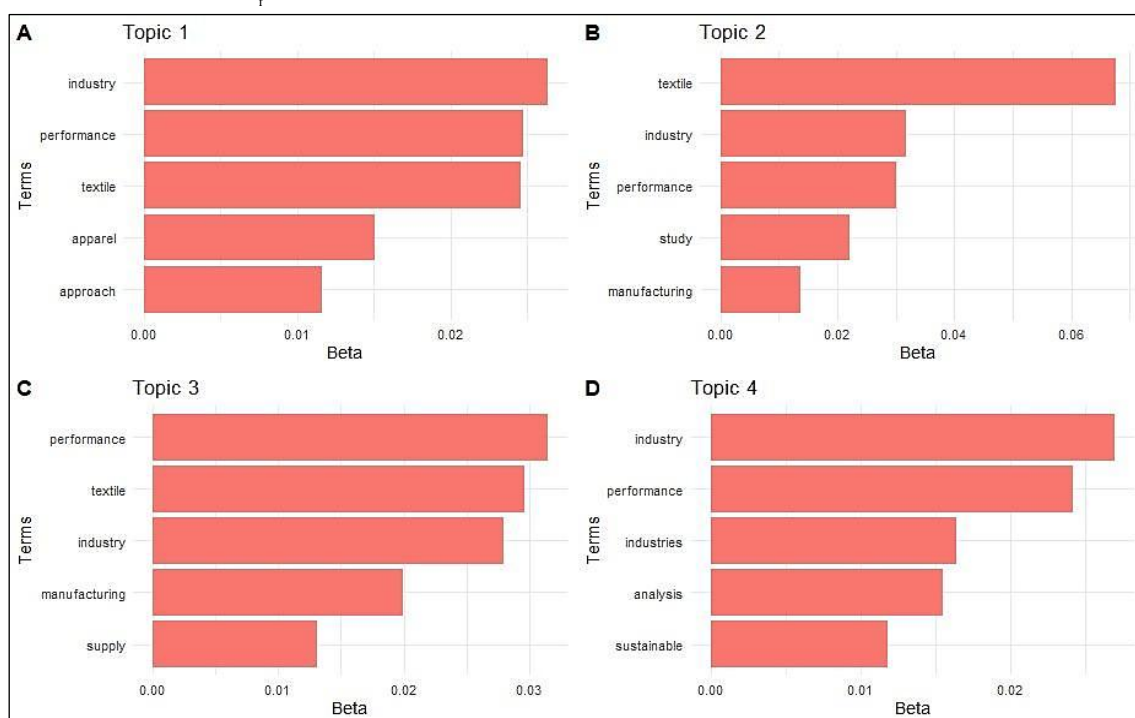


Figure 5: Topic Modelling Identified Four Distinct Themes, With Each Set of Dominant Terms Presented in the Figure (A-D)

Productive Authors and Their Collaborations

Based on our Scopus data, 1360 researchers have contributed to textile research. We aimed to gather the most prominent and noteworthy authors. Authors were selected based on a minimum of three publications and fifty references. Eight authors satisfy this set of requirements. Table 4 shows that the first-ranked author has four

publications and 224 references; the second and third ranked authors each have three articles and 194 citations. Figure 8 displays the authors' collaborations. R was used to create an interactive visualisation of the bibliometric data, which was then exported in HTML format for internal use. Ziang Y (25 links), Li J (22 links), and Chen Z (19 links) are the top three authors with the most collaborative links.

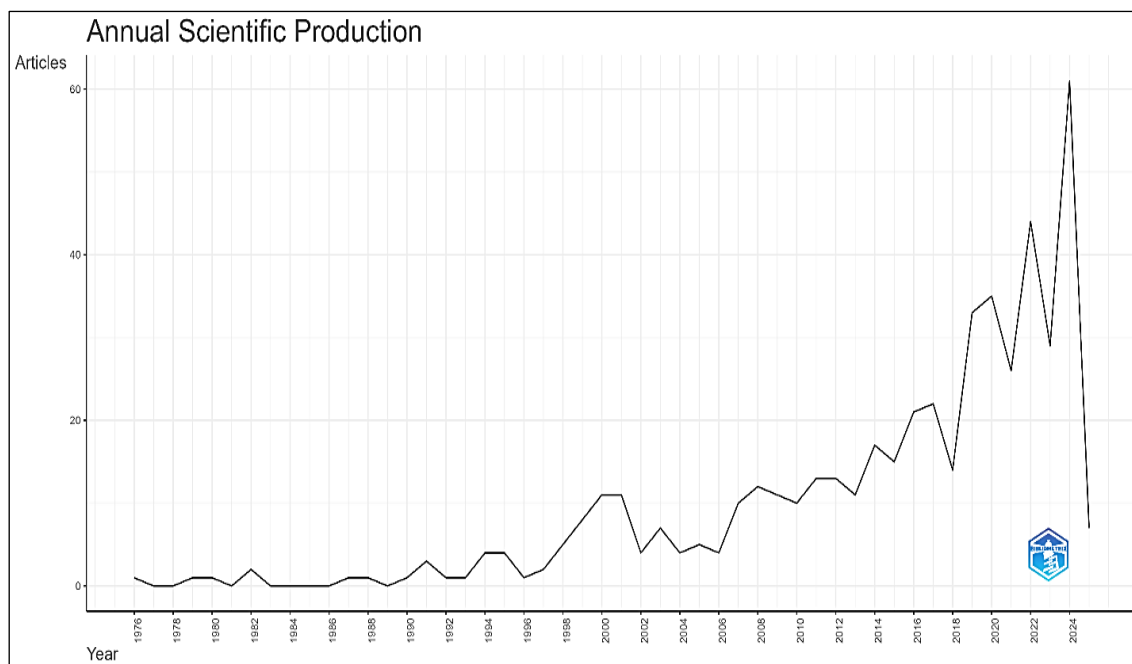


Figure 6. Yearly Publication Trends in the Textile Industry Research

Productive Countries

On the basis of the document's number, Figure 9 illustrates the most productive country list. With 169 articles, China leads the list. India is ranked second and contains 112 articles. With 93 and 75 articles respectively, the USA and UK occupy third and fourth rank. Other nations on the list are Turkey (8th, 29 papers), Pakistan (7th, 41 papers), Indonesia (6th, 43 papers), and Malaysia (5th, 46 papers). Based on citations, Table 5 shows the most cited countries list. China, the UK and the USA

are the top three most cited countries, each having total citations of 1937, 1069 and 968, respectively. The line chart in Figure 6 displays yearly publication trends from 1976 to 2025, showing a steady rise in output with significant growth after 2010.

Figure 7 illustrates the yearly average citation count of published articles from 1976 to 2025, highlighting fluctuations with peaks around 2015 and 2021.

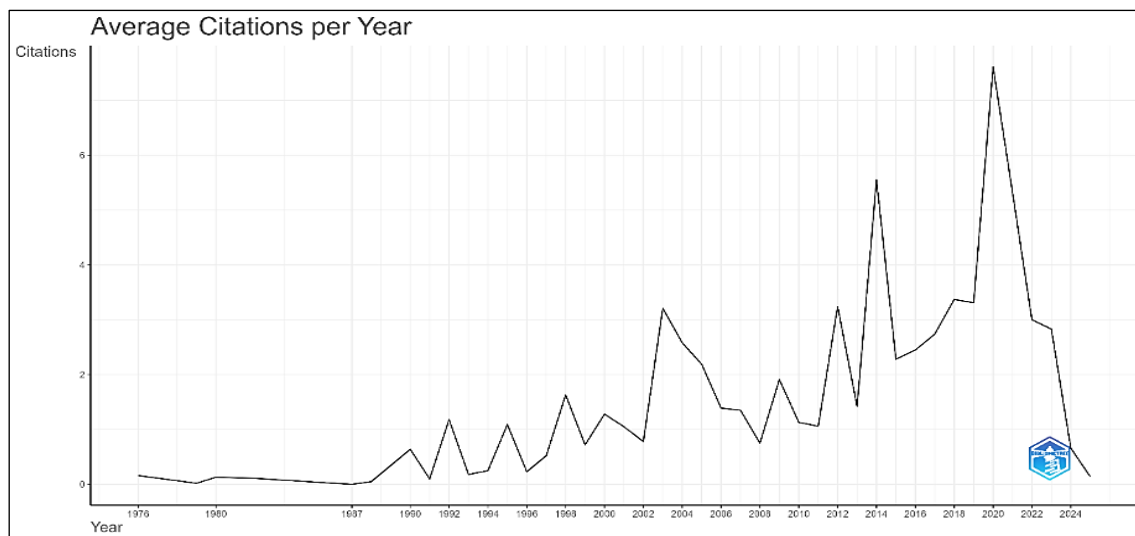


Figure 7: Average Article Citation per Year in the Textile Industry Research

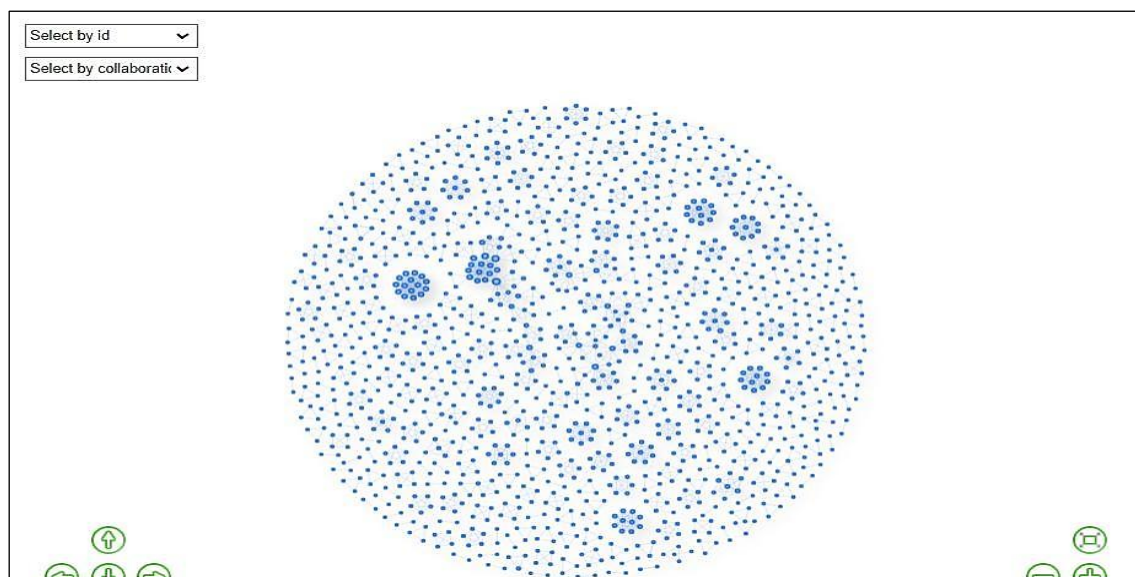


Figure 8: Author Collaboration in the Textile Industry Research

The visualisation shows the collaboration patterns among authors, where each node represents an author and clusters indicate groups of researchers with stronger co-authorship links.

Co-Occurrence Network

Figure 10 presents the co-occurrence network from our literature. It highlights two important subject categories, denoted with different colours. Blue cluster represents the textile industry, economic and industrial performance. The economic, trade, and industrial development features of the textile sector form the main emphasis of this cluster. Major topics of this cluster are studies on the efficiency and competitiveness of the industry, worldwide trade flows and market competition, production process and raw materials and country-specific research on the

textile sector. With an eye towards underdeveloped nations, this cluster clarifies the part the textile industry plays in industrial strategy, trade, and economic development. Red Cluster comprises environmental and sustainability issues of the industry. Sustainability, Environmental impact and waste management are the topics of this cluster. Studies on the environmental effects of textile manufacture, particularly concerning pollution management, strategies for lowering the industry's environmental impact, material reuse and textile processing technologies, and textile industry labour, gender studies, and workforce conditions are being discussed. Sustainability, pollution control, and industrial waste reduction are critical issues in the textile industry research.

Table 2: Top Cited Articles of Textile Research

Title	Author	Journal	TC	CPY
Industry 4.0 Technologies Assessment: A Sustainability Perspective	(18)	International Journal of Production Economics	858	143.00
Antecedents of Organisational Resilience in Economic Crises: An Empirical Study of Swedish Textile And Clothing SMEs	(19)	International Journal of Production Economics	382	31.83
Carbon Storage Potential in Natural Fibre Composites	(20)	Resources, Conservation and Recycling	336	14.61
Supply Chain Collaboration: Impact of Success in Long-Term Partnerships	(21)	International Journal of Production Economics	278	23.17
Indian Textile Suppliers' Sustainability Evaluation Using the Grey Approach	(22)	International Journal of Production Economics	192	13.71
The Impact of Environmental Management Systems on Financial Performance in Fashion and Textiles Industries	(23)	International Journal of Production Economics	174	12.43
Exporting and Firm Performance: Evidence from a Randomised Experiment	(24)	Quarterly Journal of Economics	171	19.00
Experiential Learning and Forgetting for Manual and Cognitive Tasks	(25)	International Journal of Industrial Ergonomics	162	6.23
Assembly Trade and Technology Transfer: The Case of China	(26)	World Development	155	7.05
Corporate Social Responsibility and Competitiveness within SMEs of the Fashion Industry: Evidence from Italy and France	(27)	Sustainability	150	12.50
Spatial Proximity and Firm Survival in a Declining Industrial District: The Case of Knitwear Firms in Baden-Wu"rttemberg	(28)	Regional Studies	134	9.57
Effect of Digital Transformation on Organisational Performance of SMEs: Evidence from the Taiwanese Textile Industry's Web Portal	(29)	Internet Research	128	12.80
Eco-Friendly Flame Retardant Coating Deposited on Cotton Fabrics from Bio-Based Chitosan, Phytic Acid and Divalent Metal Ions	(30)	International Journal of Biological Macromolecules	124	17.71

A Model for Evaluation and Selection of Suppliers in Global Textile and Apparel Supply Chains (31)	International Journal of Physical Distribution & Logistics Management	122	5.81
A Carbon Footprint of Textile Recycling: A Case Study in Sweden (32)	Journal of Industrial Ecology	113	10.27
A Non-Radial Malmquist Productivity Index with an Illustrative Application to Chinese Major Industries (33)	International Journal of Production Economics	112	4.87
Implementing Circular Economy in the Textile and Clothing Industry (34)	Business Strategy and the Environment	110	22.00
Experimental Investigation on Performance of Fabrics for Indirect Evaporative Cooling Applications (35)	Building and Environment	108	10.80
IC Performance of the Indian Pharmaceutical and Textile Industry (36)	Journal of Intellectual Capital	105	7.50
Consumers' Value and Risk Perceptions of Circular Fashion: Comparison between Secondhand, Upcycled, and Recycled Clothing (37)	Sustainability	102	20.40
International Linkages and Productivity at the Plant Level: Foreign Direct Investment, Exports, Imports and Licensing (38)	Journal of International Economics	101	5.32
Sustainable Polyethylene Fabrics with Engineered Moisture Transport for Passive Cooling (39)	Nature Sustainability	100	20.00
Association of Individual and Work-Related Risk Factors with Musculoskeletal Symptoms among Iranian Sewing Machine Operators (40)	Applied Ergonomics	100	9.09

Note: TC=Total Citation, CPY= Citation per Year

Table 3: Top Journals for Textile Research

Source	Documents	Citations
International Journal of Production Economics	18	2509
Sustainability (Switzerland)	44	1111
Resources, Conservation and Recycling	12	671
International Journal of Biological Macromolecules	6	314
Water (Switzerland)	12	304
International Journal of Industrial Ergonomics	6	280
World Development	5	231
Business Strategy and the Environment	6	215

International Journal of Physical Distribution and Logistics Management	3	201
Regional Studies	3	184
Quarterly Journal of Economics	1	171
Socio-Economic Planning Sciences	2	133
Building and Environment	3	131
Economic Geography	2	128
Internet Research	1	128
Applied Ergonomics	4	121
Journal of Industrial Ecology	1	113
Journal of International Economics	2	109
Journal of Intellectual Capital	1	105
Nature Sustainability	1	100

Thematic Structure

The knowledge framework of the study is effectively determined through Keywords Plus for analysis. It helps to establish connections between different research areas. This method brings attention to the main research issues. Keywords Plus, a feature of the database, offers additional keywords that briefly describe the content of a publication. Besides the author's selected keywords, it also presents broader descriptive trends. Researchers can identify research streams and topics based on keywords from existing literature using Biblioshiny, an analysis tool in the R-bibliometric program (41). Various study themes have been identified to help in conducting a more precise analysis of the data. These themes can be arranged into a strategic diagram to explore the evolution and significance of the research topic. Figure 11 presents a thematic map that displays density along the y-axis and centrality along the x-axis. The density meter indicates the extent to which a theme has evolved, while centrality reflects its relevance. The thematic map consists of four sections. The lower-left section contains themes that are either emerging or in decline, potentially introducing new research directions. The lower-right section represents core or transversal topics with low density but high centrality, which suggests that significant research has been conducted in these areas. The top-left section contains themes with dense populations but low centrality, indicating well-developed yet isolated topics. The upper-right section features highly central and densely populated themes, representing well-established and important research areas. The scale of the thematic map

represents the total number of theme components. The study consists of four main themes in textile research. They are motor, niche, basic, and weakly developed themes. Motor themes include words such as "textile industry," "textiles," and "sustainability,". They are well-developed and influential, reflecting the increased emphasis on sustainable textile production processes. Niche themes, such as "article," "human," and "industry," are highly specialised, but they are less interrelated, implying a particular focus on human aspects of the textile industry. Basic themes, such as "industrial performance," "manufacturing," and "China," remain important but require further research. The weakly developed themes, such as "dye," "recycling," and "wastewater treatment", are either underused or becoming extinct. The thematic network comprises numerous colour-coded clusters, each representing a separate research theme in the textile industry. The study emphasises recycling in textile sustainability, human elements of textile manufacture, and the increased focus on balancing environmental responsibility with economic growth. The co-occurrence network of terms used in textile industry research from 1976 to 2025 is displayed in Figure 12. The network displays four distinct groups, each of which stands for a major research topic. Studies on textile exports, trade, and industry discussions are displayed in the blue cluster. Green practices, waste management, pollution, and other environmental sustainability issues are the main focus of the red cluster. The green cluster displays more general concepts related to the textile industry, like output and exports. Finally, the purple cluster emphasises the

competitiveness, innovation, and performance of industries. The "textile industry" is a prominent theme in the literature, as evidenced by its central location and larger node size. These clusters

highlight the intersections of sustainability and performance discussions and demonstrate the breadth of topics covered by textile research.

Table 4: Top Productive Authors of Textile Research

Authors	Documents	Citation
Wang y	4	224
Tseng ml	3	194
Lim mk	3	194
Cooper ww	3	181
Zhang z	5	178
Zhang x	4	136
Dunford m	3	125
Rasiah r	3	74

Thematic Evaluation

There is a thematic evolution apart from the thematic map shown in Figure 13. It illustrates the historical development using the keywords. The thematic evolution shows the development of ideas and their background. Three-time segments and "biblioshiny" help to make the thematic progression. This time segmentation maintains a more accurate portrayal of thematic evolution based on the subjective judgment of the authors. The first section is from 1976 to 2013, the second is from 2014 to 2021, and the last section portrays 2022 to the current year, 2025. The 1976-2013 period represents the phase of industrial growth in the textile sector, characterised by limited environmental regulations and basic effluent

treatment methods. The focus was primarily on industrial output with less emphasis on environmental sustainability. 2014-2021 phase marks a transition towards more stringent environmental regulations and the adoption of advanced treatment technologies. The industry began to address issues like chemical oxygen demand (COD) and colour removal more effectively. The 2022-2025 projected period indicates a continued emphasis on sustainability, with a focus on excellent treatment practices and reducing the textile industry's adverse environmental effects.

The map in Figure 9 shows the global distribution of scientific publications, with darker shades indicating higher levels of research output.

Country Scientific Production

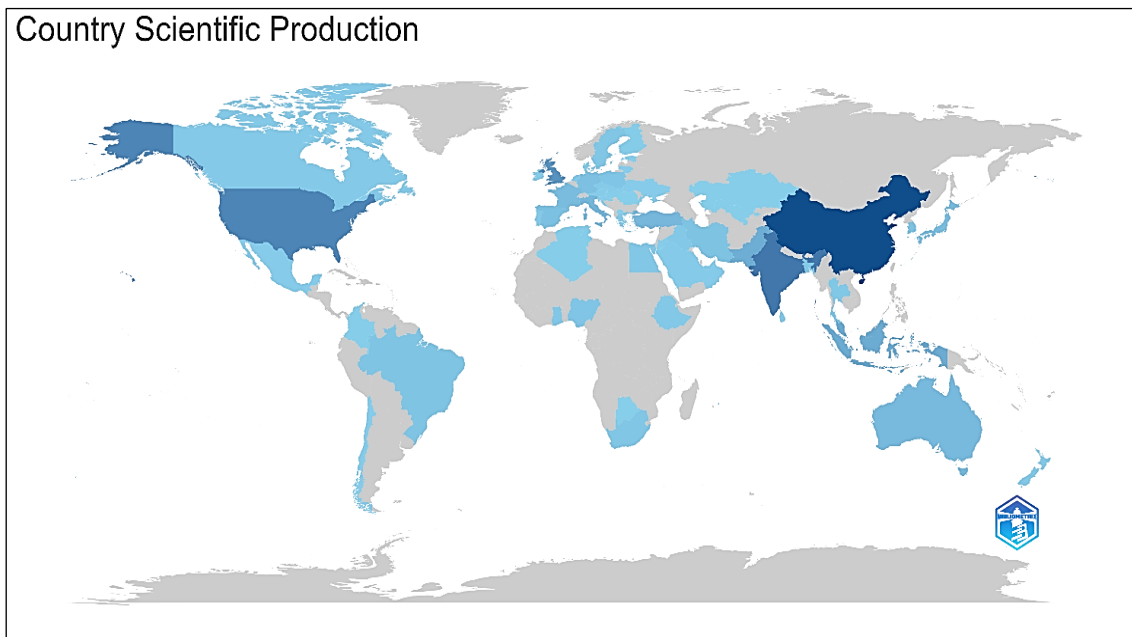


Figure 9: Productive Countries in the Textile Industry Research

Table 5: Top-Cited Countries of Textile Research

Country	TC	Average Article Citations
CHINA	1937	31.80
UK	1069	42.80
USA	968	25.50
ITALY	555	39.60
SWEDEN	496	124.00
CANADA	470	235.00
INDIA	467	13.70
AUSTRALIA	399	33.20
FRANCE	306	30.60
HONG KONG	226	56.50

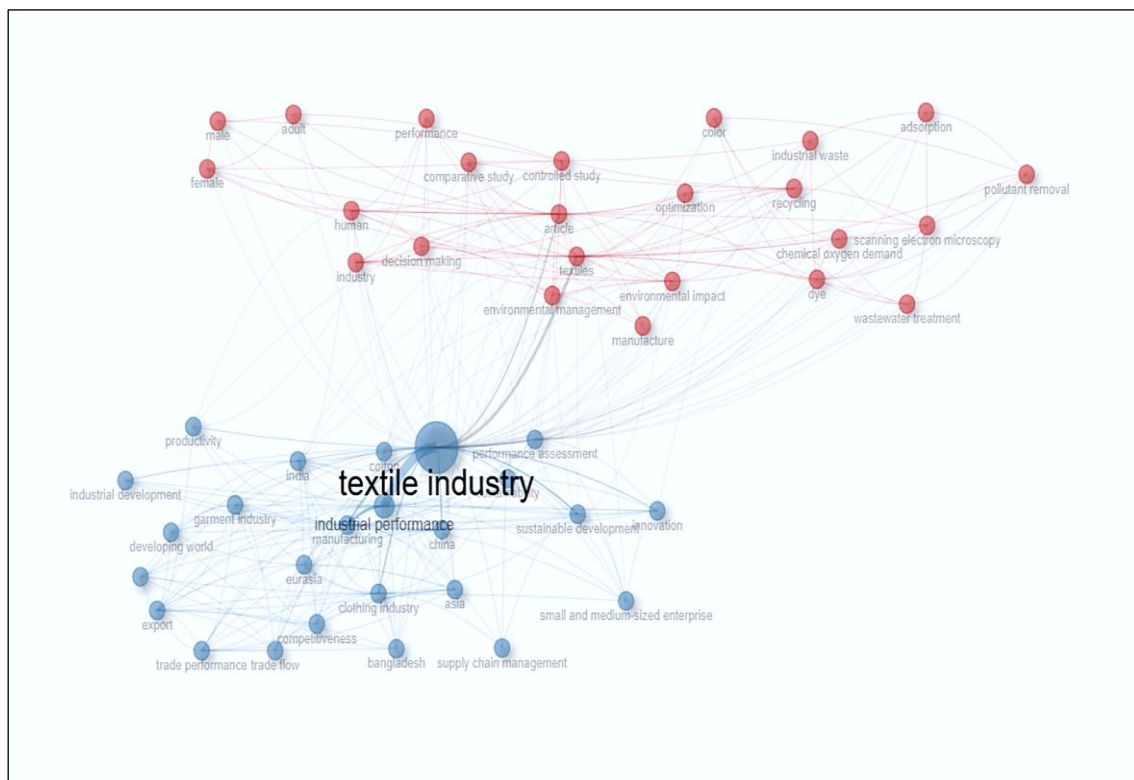


Figure 10: Keyword Co-Occurrence Network in Textile Industry Research

The network visualisation in Figure 10 illustrates the most frequent keywords and their associations, where node size reflects frequency and link thickness represents the strength of co-occurrence.

Three-Field Plot

In addition to articles' citations and yearly production, it is vital to comprehend publications' locations, main topics and associations. Figure 14 depicts a three-tiered analysis of articles on the achievements of the textile industry, starting with affiliations on the right, keywords plus on the left, and countries of interest in the middle. China leads the way in textile research; India and the USA

follow. Additionally, the United Kingdom, Italy, Australia, Malaysia, Turkey, and Pakistan make major contributions to this field of research. Issues concerning the industry and new technologies like blockchain and artificial intelligence have been much discussed.

Policy Implications

The findings of this study have several important policy implications for the textile industry. Governments and industries should promote research funding and foster collaboration between academia and industry to drive technological advancements in textile manufacturing (39).

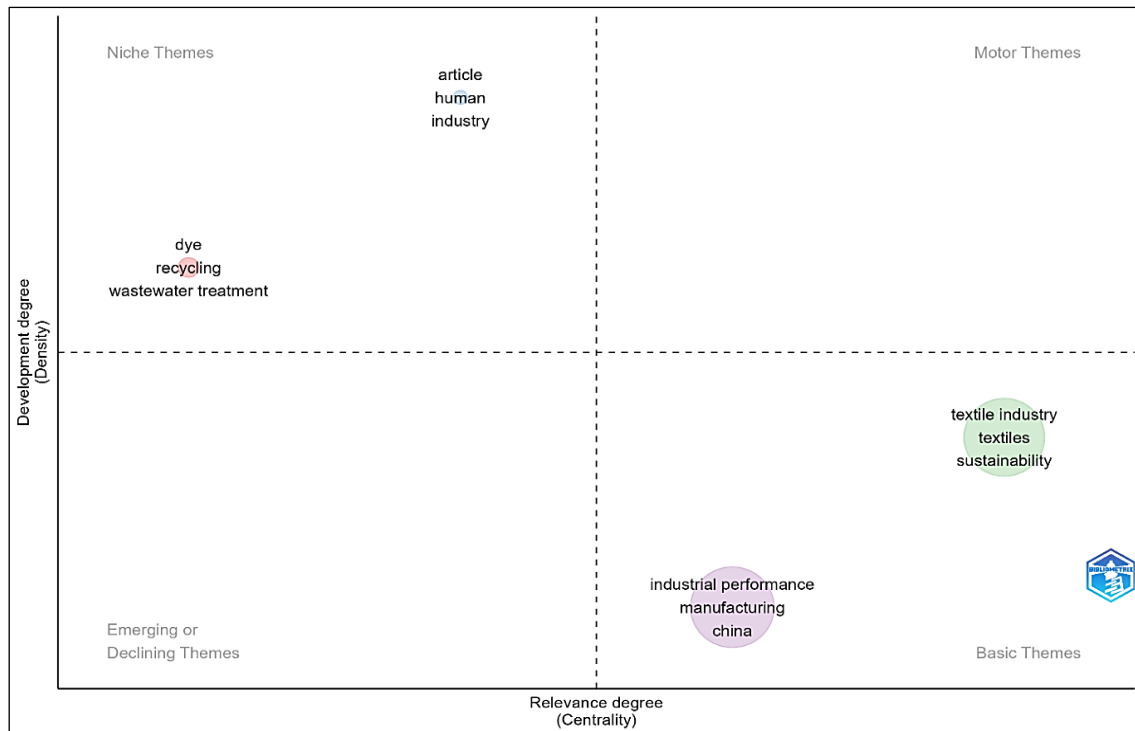


Figure 11: Thematic Map of Textile Industry Research

The map in Figure 11 presents themes based on relevance (centrality) and development (density). Themes in the upper-right quadrant represent

well-developed motor themes, while the lower-left quadrant contains emerging or declining themes.

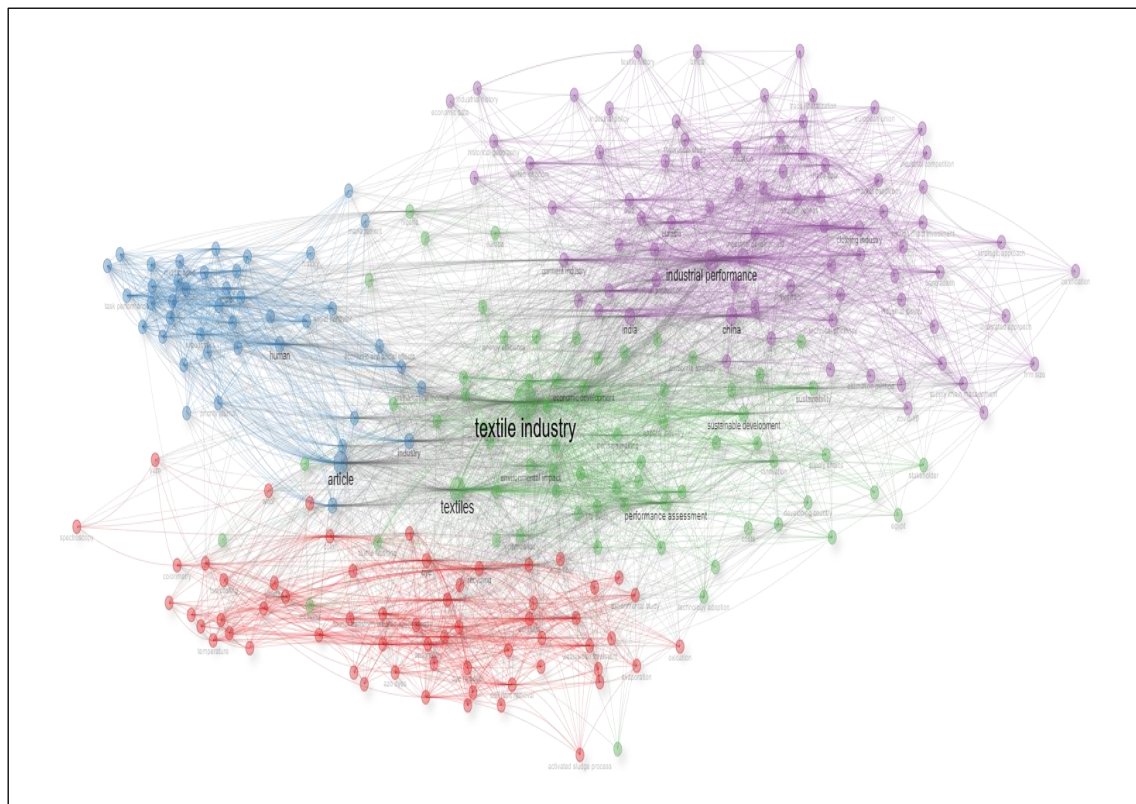


Figure 12: Thematic network of textile industry research.

The network visualisation in Figure 12 shows major themes and their interconnections. Nodes represent keywords, node size indicates frequency, and colours group related themes into clusters. Links illustrate co-occurrence relationships between themes.

China, the United States, and India are major contributors to textile research. Policymakers should encourage international partnerships, joint ventures, and knowledge-sharing initiatives to enhance innovation and competitiveness among these countries. There is a need to emphasise sustainable textile practices. Policymakers should implement eco-friendly production methods, support circular economy initiatives, and provide financial aid to firms adopting green technologies (30, 41). Digitalisation and artificial intelligence are also transforming the industry. This requires policies that facilitate the integration of AI, and big data in textile manufacturing and supply chains to improve efficiency and sustainability (29).

To ensure a skilled workforce, governments must invest in training programs that equip workers with expertise in emerging textile technologies such as technical textiles and nanotechnology (25). Furthermore, given the increasing role of innovation in the textile industry, intellectual property protection mechanisms should be introduced to encourage technological advancements and safeguard research output (42). Finally, policymakers should focus on regional development strategies that support small and medium-sized enterprises (SMEs) in the textile industry. Financial assistance, skill development opportunities, and better market access will enable SMEs to compete effectively in the global market (23). By implementing these policies, the textile industry can achieve greater sustainability, innovation, and competitiveness in an increasingly dynamic global economy. The findings of the study are also in line with real-world policy frameworks such as the circular economy model and the United Nations Sustainable Development Goals (SDGs). The study shows the importance of textile sustainability for global development plans by linking research findings to these frameworks.

Limitations and Future Research

Direction

This study is a comprehensive bibliometric review of textile research trends, though it is subject to certain limitations. The study is based on data

obtained from the Scopus database. The pattern may change if documents from other scholarly databases are added, and journals from core collections are included. Incorporating various databases would allow future research to ensure a more comprehensive representation of the existing body of knowledge. The study relies on quantitative bibliometric methodologies. It neglects the qualitative depth of research. The understanding of the theoretical advancements and methodological approaches of textile research can improve outcomes through a qualitative systematic review. The study is based on the articles published in English, while publications in other languages have been eliminated from the research. Furthermore, although research on textile sustainability predominantly concentrates on East and South Asia, more comprehensive studies from North America and Europe need to investigate working conditions, consumer behaviour, and factors of inclusion. The unevenness between regions means that future study needs to cover more areas and include more people.

Future research on the textile industry should focus on various important key areas. The integration of digital technologies and Industry 4.0 in textile performance analysis can enhance efficiency, productivity, and sustainability through automation, data analytics, and smart manufacturing. Adopting circular economy approaches for waste management and sustainable production is crucial. This includes strategies such as recycling, reusing materials, and minimising environmental impact throughout the textile supply chain. Cross-country comparative studies on industrial policies and environmental regulations in major textile hubs such as India, China, and Bangladesh can provide valuable insights into best practices, regulatory effectiveness, and the effects of policies on industry sustainability and performance.

The Figure 13 illustrates the progression of research themes across three periods: 1976–2013, 2014–2021, and 2022–2025. It highlights the transition of early themes, such as chemical oxygen demand and industrial performance, towards contemporary themes like sustainability, cellulose, wastewater treatment, and groundwater pollution. The flows represent how earlier research topics evolved into emerging themes over time.

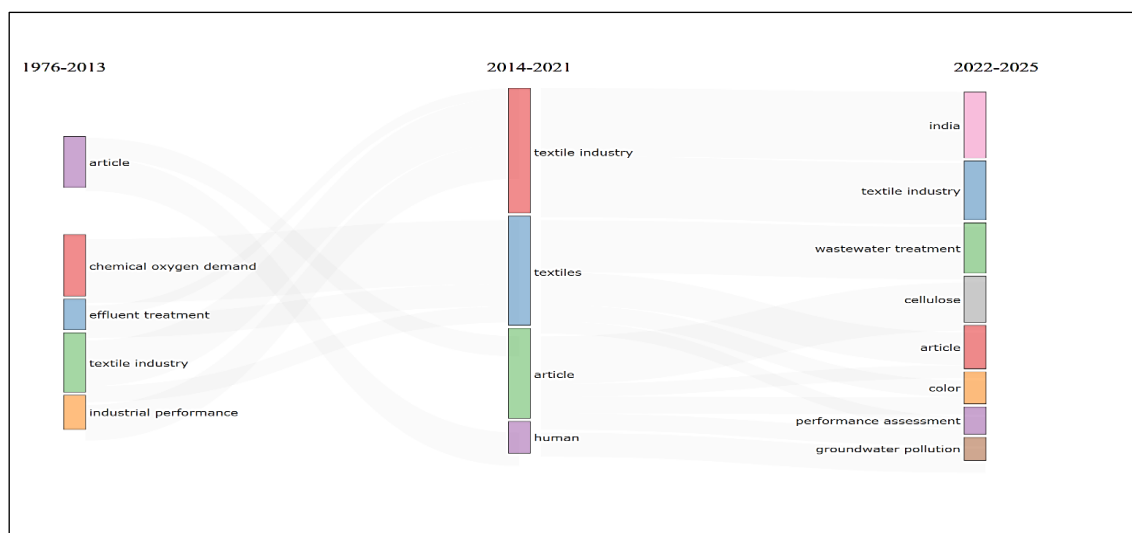


Figure 13: Thematic evaluation of textile industry research

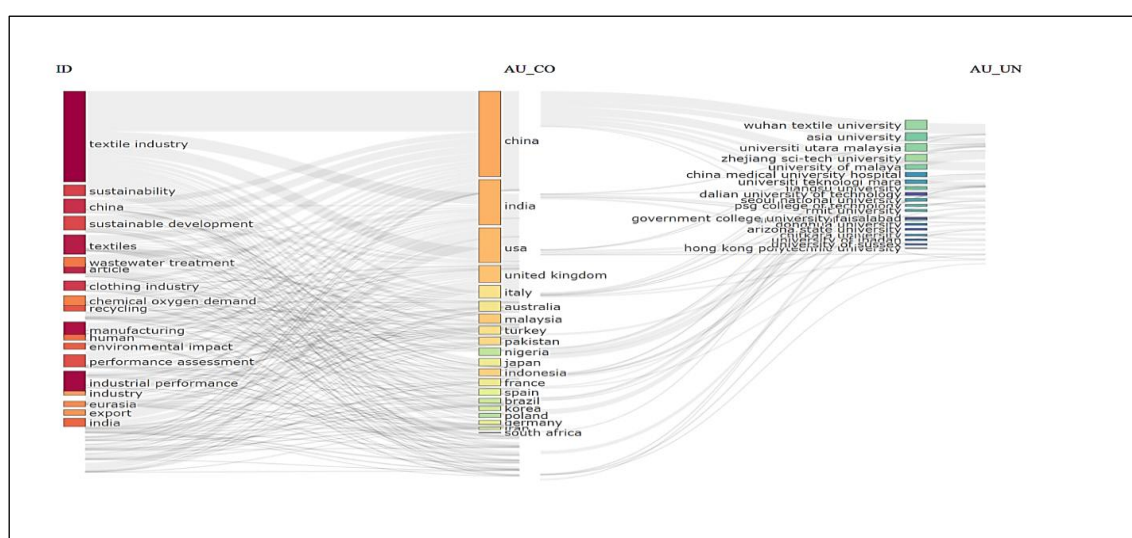


Figure 14: Three-Field Plot of Textile Industry Research

The plot (Figure 14) links key research themes (ID) with contributing countries (AU_CO) and leading institutions (AU_UN). The size of the boxes represents the frequency of occurrence, while the connecting lines illustrate the relationships between themes, countries, and universities in the textile industry research domain.

Conclusion

This study follows a systematic bibliometric literature analysis to provide a comprehensive assessment of textile research in terms of economic, environmental, and sustainable performance. It not only charts the current corpus of knowledge but also points out interesting directions for next investigation. Examining 9,192 research publications overall, the survey encompasses the range of textile-related research

across several fields and situations. Examined was a targeted subset of 487 papers looking especially for changing trends in the domains of economics, econometrics, finance, and social sciences. Important publications adding to this corpus of work are Resources, Conservation and Recycling, Sustainability (Switzerland), and the International Journal of Production Economics. Among the most important players are Yajun Wang and Ming Lang Tseng, whose work has significantly advanced the field and been referenced in more than 400 books. With 1,937 citations, Chinese authors have made the most significant contributions; next, the UK with 1,069 citations (Table 5). In conclusion, this research contributes to the richness of the existing literature on both established and emergent themes in the textile industry. It provides a strong basis for further

research focused on sustainable development and industry innovation, highlighting key areas for improvement and international cooperation.

Abbreviations

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Author Contributions

Each of the mentioned authors has approved the work and contributed significantly, directly, and intellectually.

Conflict of Interest

The authors declare that there are no conflicts of interest.

Declaration of Artificial Intelligence (AI) Assistance

During the preparation of this work, AI tools were used for language editing, grammar checking, and formatting. All intellectual and conceptual contributions are those of the authors.

Ethics Approval

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