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From Tradition to Technology: A Bibliometric Study of Handloom Research

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ABSTRACT

This study presents a bibliometric analysis of research on India's handloom industry from 1979 to 2024, using 269 publications indexed in Scopus. Tools such as Biblioshiny and VOSviewer were applied to examine publication trends, leading authors, institutions, keywords, and thematic clusters. Findings show a steady rise in research output, with significant growth after 2005 and an annual growth rate of 14.44% between 2017 and 2023. Indian institutions dominate the field, particularly the Indian Institute of Technology Kharagpur, with notable contributions from scholars like Goswami K. and Hazarika B. Textile Magazine and Asian Textile Journal emerge as leading publication outlets. Frequent keywords highlight focus areas such as "textile industry," "handloom," and "weaving," while thematic mapping reveals clusters around "cottage industry" and "handloom weavers." Emerging themes include "commerce," "silk," and the integration of "artificial intelligence" in the sector.

***Keywords**: Handloom Industry, Weaving Sector, Textile Research, Cottage and Small-Scale Industries, Thematic Mapping, Emerging Research Themes.*

Introduction

Bibliometric methodology applies quantitative techniques—such as co-citation and co-word analysis—to examine bibliographic data and uncover influential authors, countries, and institutions contributing to a particular field (Broadus, 1987; Xu et al., 2018). This approach enables a structured understanding of the intellectual and thematic development of research.

The present study aims to explore the following research questions:

- What are the prominent trends in handloom industry research in terms of keywords, journals, authors, and contributing nations?
- How is the conceptual structure of handloom industry research mapped?

The handloom industry remains a cornerstone of rural and semi-urban livelihoods, while also safeguarding cultural heritage. Existing scholarship has primarily examined its socio-economic importance, technological transitions, and policy dimensions. By synthesizing current research patterns, this review highlights prevailing themes and points toward emerging directions for future inquiry.

Socio-Economic Significance of the Handloom Industry

The handloom industry is a significant source of employment, particularly for rural women and marginalized communities in India. Authors such as Goswami and Hazarika have frequently examined the employment and socio-economic role of this sector. The findings reveal how the industry supports livelihood generation while preserving artisanal skills (Goswami et al., 2019). Additionally, traditional craft industries such as handlooms are recognized for contributing to cultural identity and promoting sustainability through minimal reliance on mechanized processes (Das et al., 2017).

Technological Integration and Emerging Themes

Recent studies explore the introduction of technology into the handloom industry, including themes such as artificial intelligence and automation. Bibliometric analyses reveal that emerging keywords like "commerce" and "AI" indicate growing interest in improving production processes and market outreach (Baker et al., 2020). Tools like Biblioshiny and VOSviewer have enabled researchers to map intellectual structures, pinpoint major contributors, and track the adoption of innovative tools in handloom weaving and trade logistics (Aria & Coccurullo, 2017).

Challenges and Research Gaps

Despite notable progress in handloom research, several crucial areas remain insufficiently addressed. Keywords such as “silk,” “yarn,” and “employment” indicate limited exploration of raw material sustainability and workforce challenges in a rapidly evolving technological environment. Prior studies also stress the need for greater stakeholder involvement to integrate sustainable and eco-friendly practices (Xu et al., 2018). Future research could therefore focus on the sector’s preparedness to adopt advanced technologies while preserving its cultural and traditional essence.

Objectives

- To identify the most significant and emerging research trends in the handloom industry based on keywords and subject areas.
- To analyze the key journals, authors, and publications contributing to handloom industry research.
- To examine the contributions of different nations and regions in advancing scholarly work on the handloom industry.
- To map the intellectual structure and thematic evolution of research in the handloom sector over time.

Methodology

Bibliometric analysis offers a methodological advancement over traditional literature reviews by employing statistical techniques to assess both quantitative and qualitative developments within a research domain. It enables profiling of publication trends, mapping of scholarly contributions, and identification of emerging patterns across disciplines (Baker et al., 2020).

A critical step in bibliometric research lies in selecting an appropriate database for data retrieval. Scopus, recognized as one of the most comprehensive and reliable repositories of academic literature, was chosen for this study. The dataset spans from 1979 to November 2024, with “handloom industry” used as the primary search term. The retrieved records facilitated an examination of authors, affiliations, research areas, journals, document types, and contributing nations.

Data analysis was carried out using R software with the Biblioshiny for Bibliometrix package, a widely acknowledged tool for bibliometric studies (Aria & Coccurullo, 2017). Biblioshiny was employed to generate graphs, while Excel supported calculations of percentages and frequencies. In addition, VOS viewer was utilized to construct and visualize bibliometric networks, offering deeper insights into co-authorship, co-citation, and keyword linkages.

The results of these analyses are presented in subsequent sections through a combination of graphs, tables, and maps, providing a comprehensive overview of the research landscape.

Results

- **General Information and Annual Publication Output**

Table 1: Summary of Bibliometric Analysis from Scopus

Description		Results
Main information about the data	Timespan	1979:2024
	Sources (Journals, Books, etc)	141
	Documents	269
	Annual Growth Rate %	5.87
	Average citations per doc	5.547
	References	5588
Document types	Article	269
Document contents	Keywords Plus (ID)	587
	Author's Keywords (DE)	597
Authors	Authors	439
	Authors of single-authored docs	99
Authors collaboration	Single-authored docs	108
	Co-Authors per Doc	1.5
	International co-authorships %	5.57

- **Annual Publication Growth**

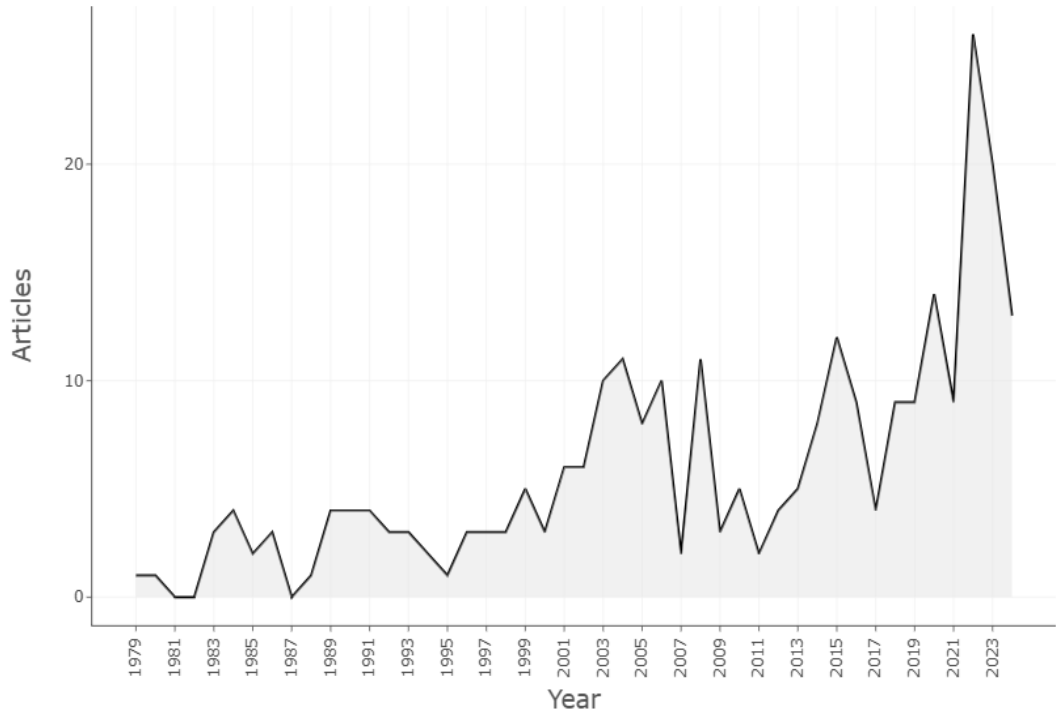


Figure 1: Annual Scientific Production

In the bibliometric analysis of the handloom industry, Figure 1 depicts the annual publication trends, showing a steady rise in research output over time. Between 1979 and 2024, a total of 269 publications were identified. The initial phase (1979–1985) recorded only 24 publications, reflecting limited scholarly engagement. A notable surge in research activity emerged after 2005, marking a period of rapid expansion. From January 2017 to September 2023 alone, 250 documents were published, corresponding to an annual growth rate of 14.44%.

- **Three-field Plot**

To visualize the connections among sources, countries, organizations, keywords, prominent authors, and cited references, Biblioshiny employs a three-field plot. This diagram uses colored rectangular blocks to represent different elements, with the height of each rectangle reflecting its relative significance. The broader the rectangle, the stronger the connections across categories.

Figure 2 illustrates the relationship between organizations (left), authors (center), and keywords (right) in handloom industry research. The analysis highlights frequently used terms associated with leading authors such as Goswami K., Hazarika B., Rai S. K., Bortamuly A. B., and Handique K. These scholars represent institutions including the Indian Institute of Technology Kharagpur, Indian Institute of Technology, University of Delhi, National Institute of Technology Silchar, and the Indian Institute of Management. Prominent keywords such as handloom, weavers, handloom industry, and cotton consistently emerge across authors, organizations, and thematic clusters.

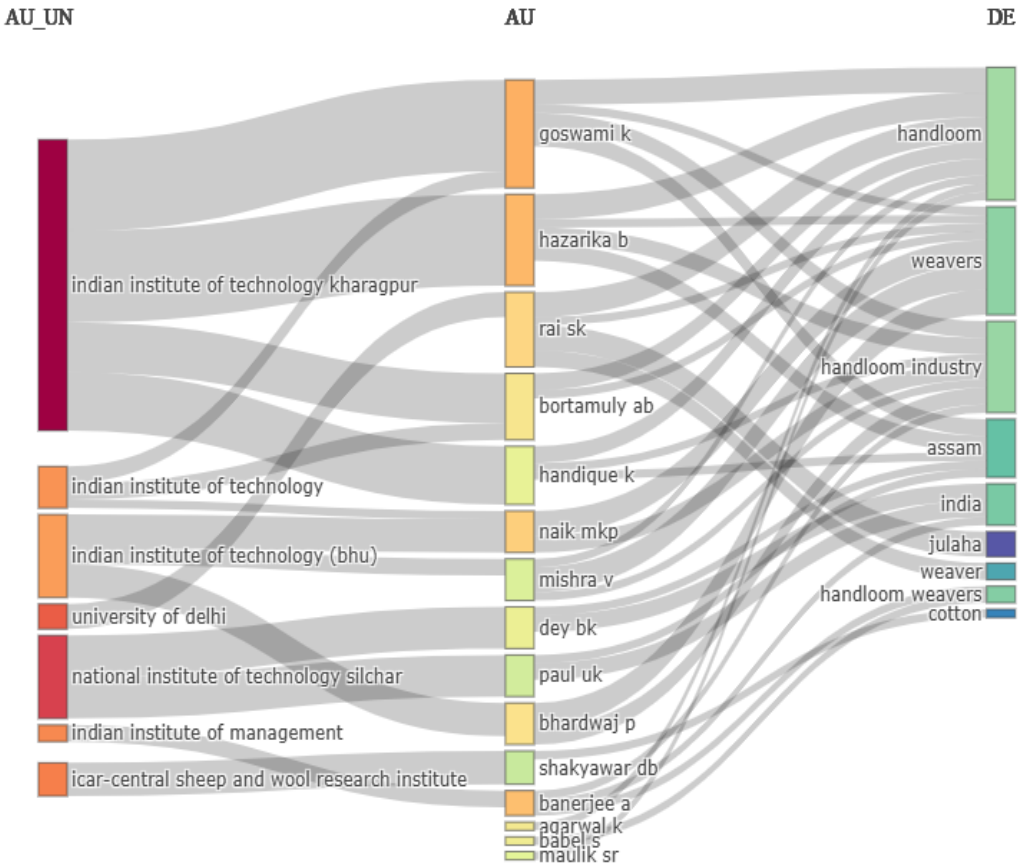


Figure 2: Three-field plot Organisations (left), author (middle) and keyword (right)

- **Most Relevant Sources**

Figure 3 highlights the top 10 journals with the highest publication output on the handloom industry. In total, 269 articles were retrieved from 141 different sources between 1979 and 2024. Among these, Textile Magazine, Asian Textile Journal, Indian Silk, Manmade Textile in India, and the Journal of Rural Development stand out as the most productive journals, collectively contributing 127 documents. These sources serve as key platforms for disseminating research on handloom weaving, rural development, textiles, and related themes, reflecting both the academic and industry-oriented focus of scholarship in this field.

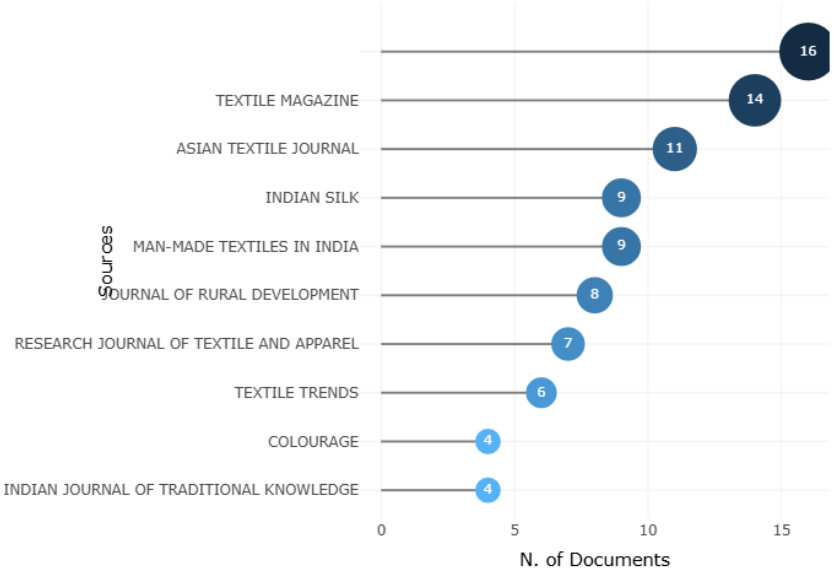


Figure 3: Most Relevant Sources

- **Most Relevant Authors**

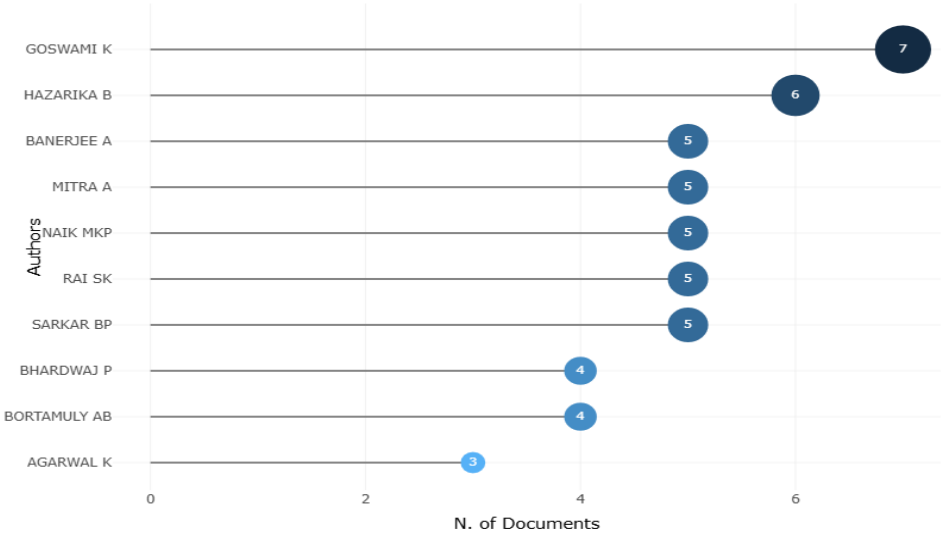
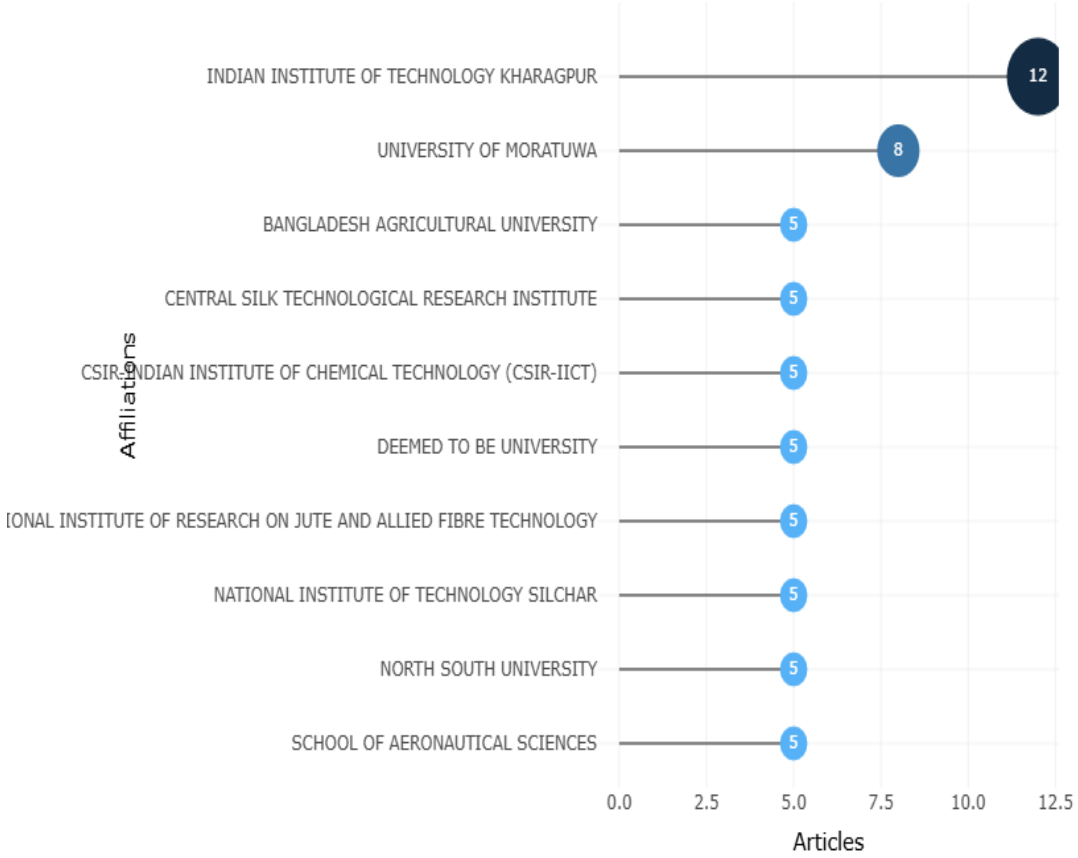


Figure 4: Most Relevant Authors

Based on the bibliometric analysis, the top writers on the issues of handloom industry are indicated in Figure 4. 269 research papers on the current research topic were written by a total of 439 authors. With 7 publications published, Goswami K was the most productive author, followed by Hasarika B. and Banerjee A. with 6 and 5 documents, Mitra A., Naik MKP, Ria SK, Sarkar BP, Bhardwaj P., Bortamuly AB and Agarwal K.

- **Most Relevant Affiliations**

As depicted in Figure 6, this study also examined the publications produced by organizations or author affiliations that contributed to handloom industry-based research. The outcomes of the handloom industry are produced by 158 institutions. The University of Moratuwa came in second with 8 documents, trailing the Indian institute of Technology Kharagpur in first place with 12 documents.



- **Most Frequent Words**

Table 2 presents the top 10 author keywords in handloom industry publications, while Figure 9 displays a tree plot of the 50 most frequently used keywords. Among these, 24% of the top 50 keywords were dominated by the term “textile industry”, which appeared 65 times. “India” was used 44 times, representing 16% of the occurrences. Other frequently cited keywords include “weaving” (41 occurrences) and “handloom” (38 occurrences), together accounting for 14% of the keywords. Additional commonly used terms are “employment”, “cotton”, “hand weaving”, and “weaving industry”, reflecting the central themes in handloom research.

Table 2: Most Frequent Words

Words	Frequency	Percentage
Textile industry	65	24%
India	44	16%
Weaving	41	15%
Handloom	38	14%
employment	15	5%
cotton	14	5%
Hand weaving	14	5%
Weaving industry	14	5%
Economic information	13	4%
Exports	13	4%

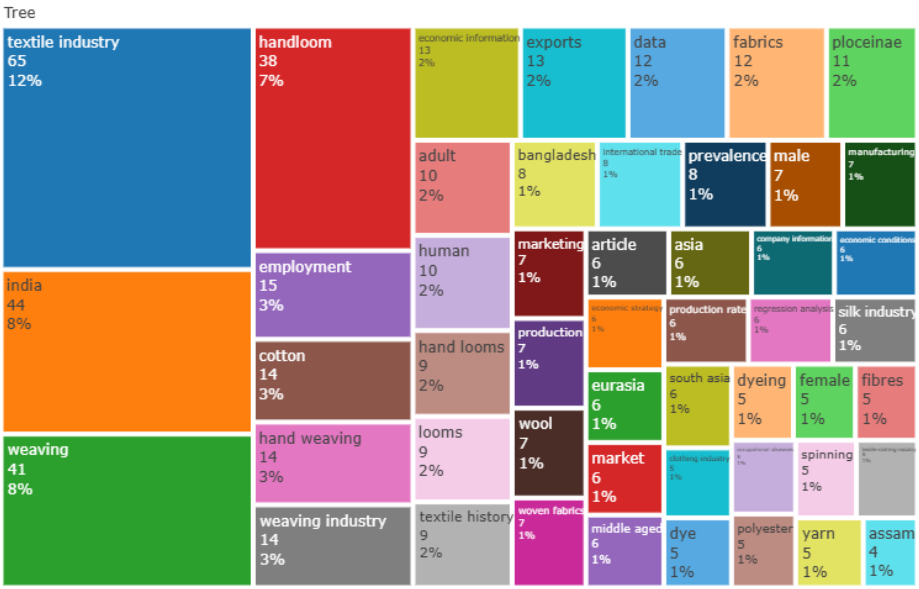


Figure 7: Tree Plot of top 50 Author-Keywords

- **Keyword Analysis**

The 269 articles in the study were categorized by looking up and analysing the most popular keywords. This analysis makes the topics that appear repeatedly in the focus area stand out. On the Figure 8 map, the keywords are arranged into seven clusters. Textile industry (dark red cluster), handloom weavers (yellow cluster), weaving (dark blue cluster), handloom (green cluster), looms (purple cluster), cottage industry (light red cluster), and fabrics (light blue cluster) are the primary keywords for each cluster. This map also demonstrates the apparent paths the study is taking and the possible topics for further research opportunities: handloom industry and cottage.

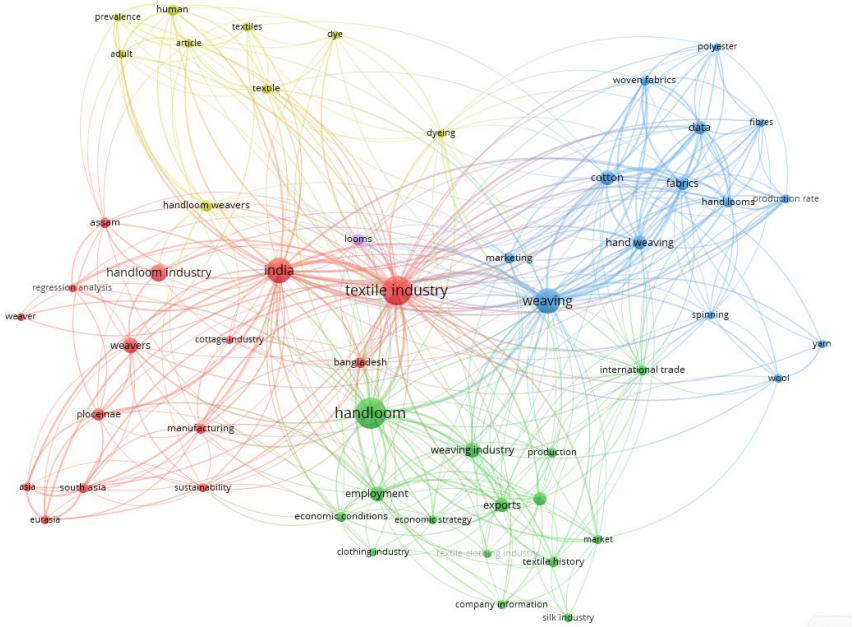


Figure 8: Keyword analysis

There are 597 keywords found in the 269 articles. Seven important terms, including "textile industry," "handloom," "cotton," "weaving," "fabrics," "weaving industry," and "India," appeared more than 50 times among the 232 words that did appear. Both "handloom" and "textile industry" appear in 89 and 54 articles, respectively.

- **Thematic map**

Thematic map displaying clusters and keywords Plus found by the co-occurrence network from 1979 to 2024. The X-axis denotes a theme's centrality and importance, while the Y-axis denotes its density. Figure 9 displays the theme map within the context of the handloom industry. The main themes in the lower right quadrant, including handloom, employment, and the weaving industry, point to important yet understudied areas. The upper left quadrant's speciality topics wool, yarn and fabric—have little bearing on this topic. The main themes in the third quadrant are the textile industry and India. Emerging themes include commerce, silk and artificial intelligence.

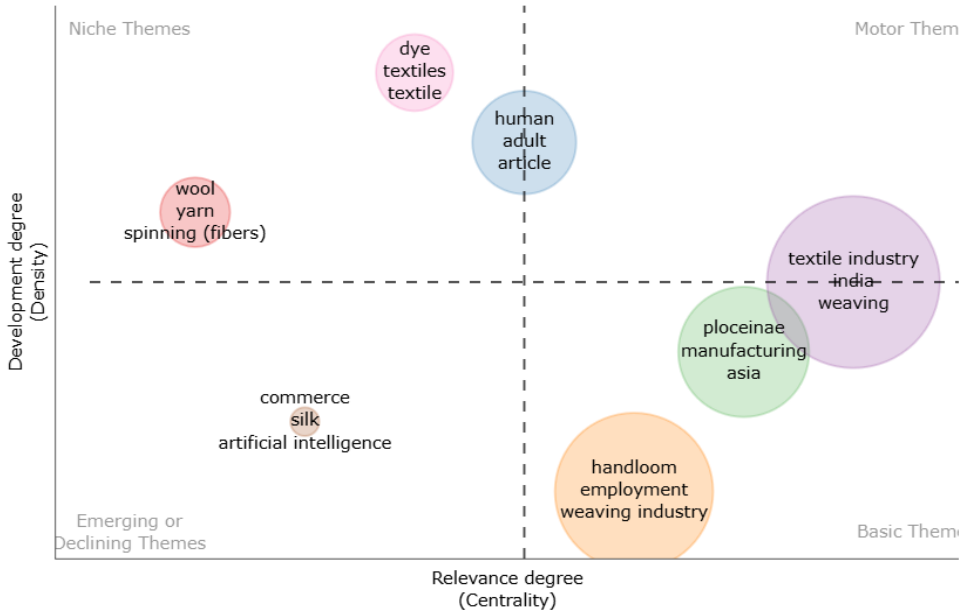


Figure 9: Thematic Map

Analysis

This bibliometric study provides a comprehensive overview of the evolving research landscape of India's handloom industry, highlighting key trends, intellectual structures, and emerging themes. The analysis reveals sustained scholarly interest, with a marked increase in publications post-2005 and an annual growth rate of 14.44% between 2017 and 2023, reflecting the growing recognition of the sector's socio-economic significance, including employment generation, cultural preservation, and technological innovation. Core thematic areas such as *textile industry*, *weaving*, and *handloom weavers* underscore the foundational relevance of these topics within the field.

Indian researchers and institutions dominate the discourse, particularly the Indian Institute of Technology Kharagpur and scholars like Goswami K. and Hazarika B., highlighting the role of academic collaborations in advancing knowledge and developing solutions for this labor-intensive sector. Prominent keywords like *cottage industry*, *handloom industry*, and *cotton* reflect the intersection of traditional craftsmanship with contemporary research needs, emphasizing sustainability and employment concerns.

The study also identifies gaps and emerging opportunities. While traditional themes such as *employment* and *textile industry* remain central, newer topics like *artificial intelligence* and *commerce* suggest the potential for technology-driven modernization, enhancing operational efficiency, market reach, and product innovation. Additionally, underexplored areas such as *silk*, *fabric*, and *yarn* offer promising avenues for future research and development.

Journals such as *Textile Magazine* and *Asian Textile Journal* play a pivotal role in disseminating research, while tools like Biblioshiny and VOSviewer facilitate mapping of research networks, identification of prolific authors, and analysis of co-citation patterns. This approach enriches the understanding of existing literature and lays the groundwork for future studies.

In conclusion, the bibliometric insights not only chart the academic footprint of the handloom industry but also underscore strategic priorities for its future. Focusing on underexplored themes, fostering international collaboration, and addressing sustainability challenges can drive innovation, ensuring the sector's continued relevance and resilience in a globalized economy.

Conclusion

The bibliometric analysis of the handloom industry from 1979 to 2024 provides valuable insights into research trends, emerging themes, and the intellectual structure of the field, thereby achieving the objectives of this study. The analysis demonstrates a steady increase in publication output, with a notable surge after 2005 and an accelerated annual growth rate of 14.44% between 2017 and 2023, reflecting growing scholarly interest in the sector's socio-economic and technological dimensions.

Key findings in relation to the objectives include:

- Frequent keywords such as textile industry, handloom, weaving, and India highlight the central focus areas of handloom research. Thematic and keyword analyses reveal dominant research clusters, including textile industry, handloom weavers, and cottage industry, while emerging themes such as commerce, silk, and artificial intelligence indicate new avenues for investigation.
- Prominent contributors include Indian researchers and institutions, notably the Indian Institute of Technology Kharagpur, with authors such as Goswami K. and Hazarika B. making significant contributions. Leading journals publishing handloom-related research include Textile Magazine, Asian Textile Journal, and Journal of Rural Development.
- The analysis highlights the dominant role of Indian researchers and institutions in advancing scholarly work on the handloom sector, reflecting both national expertise and the cultural significance of handloom in India.
- The study demonstrates the effectiveness of bibliometric tools such as Biblioshiny and VOS viewer in mapping intellectual networks, thematic clusters, and the evolution of research priorities over time.

Overall, the findings offer guidance for policymakers, researchers, and stakeholders to foster innovation, enhance sustainability, and address challenges in employment and technological integration. Future research should target underexplored themes identified in this analysis to support the modernization and growth of the handloom sector.

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