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A Bibliometric Analysis of Sustainable Supply Chain Finance Research

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ABSTRACT

This study presents a bibliometric analysis of sustainable supply chain finance (SSCF) research to map its intellectual structure, evolution, and emerging trends. By examining a dataset sourced from Scopus and Web of Science, the study employs VOSviewer to visualize keyword co-occurrence, author collaborations, and thematic developments within SSCF literature. The results reveal a significant shift towards integrating financial mechanisms with sustainability goals, with a growing focus on "green finance" and "sustainable finance" linked to environmental objectives. Technological advancements, particularly blockchain and artificial intelligence, are emerging as key tools for enhancing sustainability in supply chains. The analysis highlights the central roles played by countries like India, China, and the United States, while also identifying research gaps, especially in the practical implementation of new technologies and the underrepresentation of developing nations. The study provides insights for future research and practical application in the sustainable supply chain finance domain.

Keywords: *Sustainable Supply Chain Finance, Green Finance, Blockchain, Artificial Intelligence, Sustainable Development, Bibliometric Analysis*

1. INTRODUCTION

In an era where environmental degradation and social inequities have emerged as global concerns, corporations and research institutions increasingly emphasize sustainability within business operations [1]. Traditionally, sustainability efforts were largely confined to operations management and corporate social responsibility initiatives. However, the intrinsic connection between sustainability and finance has led to innovative financial models aimed at supporting environmentally and socially responsible business practices [2]. One such innovation is sustainable supply chain finance (SSCF) — a financial mechanism that integrates sustainability principles into the financing of supply chain activities. At its core, SSCF seeks to align the interests of buyers, suppliers, and financial institutions to ensure that economic, environmental, and social values are co-created throughout the supply chain [3]. This approach not only encourages suppliers to adopt sustainable practices but also enhances the resilience, transparency, and competitive advantage of supply chains in a world shaped by climate change and stakeholder activism.

Supply chains have become complex networks of interdependent entities that stretch across geographic, cultural, and economic boundaries. This complexity introduces not only operational risks but also sustainability challenges related to labor practices, resource depletion, and carbon emissions [4]. Conventional supply chain finance focuses primarily on optimizing working capital and reducing financing costs for buyers and suppliers. While financially effective, this approach often fails to reward sustainable performance or mitigate environmental and social risks [5]. As regulatory pressures intensify and stakeholders demand greater environmental accountability, the integration of sustainability criteria into supply chain financing decisions represents a strategic necessity rather than an optional value-add [6]. SSCF has thus emerged from the intersection of sustainable supply chain management and financial innovation, encouraging stakeholders to

evaluate financing options not only based on cost and efficiency but also on sustainability outcomes [7].

The academic interest in SSCF reflects broader trends in sustainability research that prioritize interdisciplinary inquiry. Early studies in supply chain finance focused on transactional efficiency and risk mitigation, whereas recent scholarship increasingly emphasizes the social and environmental implications of financial mechanisms [8]. This evolution mirrors developments in adjacent fields such as green finance, impact investing, and circular economy financing — all of which explore how financial tools can catalyze sustainable transitions [9]. A key component of SSCF is the incorporation of sustainability performance indicators — such as carbon intensity, labor standards, and waste reduction — into financing criteria. These indicators shift the evaluation of risk and performance beyond traditional financial ratios, allowing financial institutions to differentiate between suppliers based on sustainability credentials [10]. As a result, SSCF contributes not only to financial optimization but also to broader sustainability goals that are aligned with global frameworks like the United Nations Sustainable Development Goals (UN SDGs) [11].

Despite its growing prominence, SSCF is still an emerging field with diverse conceptual interpretations and varying applications across industries. For example, in the manufacturing sector, SSCF may emphasize energy efficiency and waste reduction among suppliers, whereas in the agricultural sector, it might focus on fair labor practices and biodiversity conservation [12]. These contextual variations underscore the need for a systematic understanding of how SSCF research has evolved, which topics have been emphasized, and where gaps remain. Bibliometric analysis — a quantitative method for evaluating research trends, influential publications, and intellectual structures — offers a rigorous approach to mapping the SSCF research landscape [13]. Through bibliometric techniques such as co-citation analysis, keyword co-occurrence, and publication trend tracking, scholars can assess the development of SSCF as a research domain and identify emerging topics that warrant further investigation [14].

The proliferation of research on sustainable supply chain finance has been accompanied by a diversity of methodologies and theoretical perspectives. While some studies adopt qualitative case analyses to explore firm-level applications of SSCF, others employ econometric modeling to examine the financial impacts of sustainability-linked financing [15]. Yet, the fragmentation of methods and thematic foci makes it challenging to synthesize the existing body of knowledge and establish a coherent research agenda. A bibliometric approach can thus provide clarity by revealing the structural patterns of research collaboration, the clustering of subject areas, and the intellectual roots from which SSCF scholarship has grown [16]. This systematic mapping is especially valuable for early-career researchers and policymakers who seek to understand the trajectory of SSCF research and leverage insights for future inquiry or practical implementation.

Understanding the development of SSCF research is not simply an academic endeavor; it has practical implications for how organizations design financial products and sustainability strategies. Financial institutions increasingly use sustainability-linked indicators in structuring loans, trade finance, and dynamic discounting programs [17]. By linking financial incentives to sustainability performance, SSCF has the potential to transform typical buyer–supplier relationships, leading to more equitable and environmentally responsible supply networks [18]. However, without a clear understanding of the trajectory of research — including foundational theories, leading contributions, and emerging themes — it is difficult to assess how effectively research is informing practice. Consequently, a bibliometric analysis not only contributes to theory building but also offers

a reflective lens through which practitioners can evaluate the alignment between academic research and real-world challenges.

Despite the rapid growth of research in sustainable supply chain finance, there is a lack of comprehensive synthesis that maps the intellectual structure and research evolution of the field. Previous reviews tend to be narrative or focused on specific industries or geographic contexts, which limits the understanding of broader scholarly trends and emerging research frontiers. Without systematic bibliometric analysis, the field may remain fragmented, impeding efforts to identify core research themes, influential authors, and potential gaps that warrant further exploratory or empirical investigation (Author, Year). This fragmentation poses challenges for scholars seeking to build cumulative knowledge and for practitioners aiming to implement evidence-based SSCF models. The objective of this study is to conduct a bibliometric analysis of sustainable supply chain finance research to systematically map its development, identify influential publications and authors, analyze key thematic clusters, and highlight emerging trends and gaps in the literature.

2. METHODS

This study adopts a bibliometric research design to systematically analyze the intellectual structure, evolution, and thematic development of sustainable supply chain finance (SSCF) research. Bibliometric analysis is a quantitative method that applies mathematical and statistical techniques to scholarly publications in order to identify publication trends, influential authors, core journals, and collaborative networks [19]. This approach is particularly suitable for emerging and interdisciplinary research fields such as SSCF, where the volume of literature has grown rapidly and thematic boundaries remain fluid. By objectively mapping existing research, bibliometric methods help reduce subjectivity associated with traditional narrative reviews and enable a comprehensive overview of the knowledge domain.

The bibliographic data for this study were collected from Scopus Database. A structured search strategy was employed using keywords related to “sustainable supply chain finance,” “green supply chain finance,” “sustainability-linked financing,” and closely related terms. The search was limited to journal articles published in English to ensure consistency and academic rigor. After the initial retrieval, data cleaning procedures were applied to remove duplicate records, irrelevant documents, and incomplete entries. The final dataset included bibliographic information such as authors, titles, abstracts, keywords, publication years, sources, and citation counts, which formed the basis for subsequent analysis.

Data analysis was conducted using bibliometric software tools designed for scientific mapping and network visualization. Subsequently, advanced bibliometric techniques such as co-authorship analysis, co-citation analysis, and keyword co-occurrence analysis were applied to uncover collaboration patterns, intellectual foundations, and thematic clusters within the literature. Network visualizations were used to illustrate relationships among authors, institutions, and research themes, enabling the identification of dominant research streams and emerging topics.

3. RESULTS AND DISCUSSION

3.1 Network Visualization

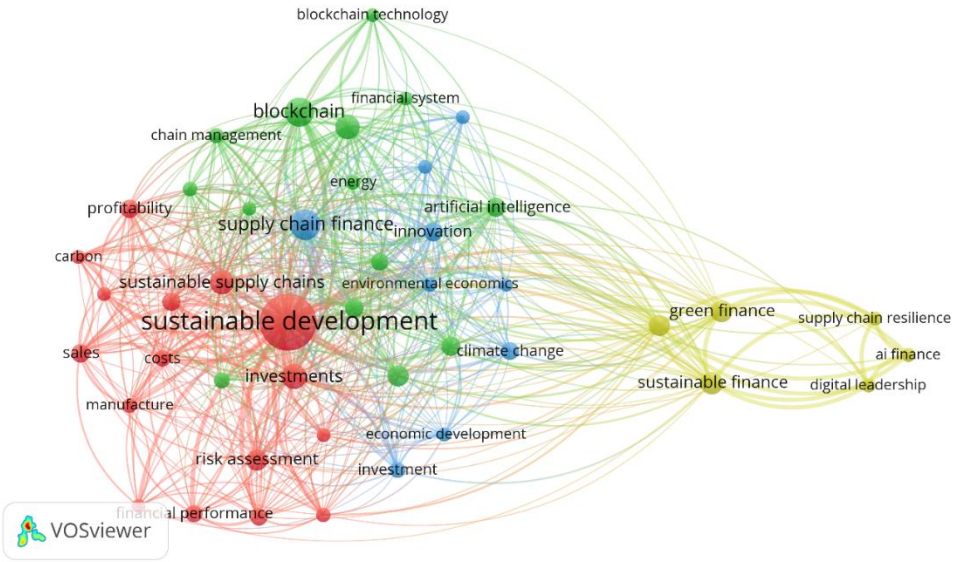

Figure 1. Network Visualization
Source: Data Analysis Result, 2026

Figure 1 displays the relationships and connections between key concepts in the field of sustainable supply chain finance research. The dominant cluster, represented by the central node, is "Sustainable Development," a key concept that ties together a variety of themes related to sustainability. The red cluster surrounding this central node contains terms like "carbon," "sustainable supply chains," "sales," and "costs." This suggests that much of the research in sustainable supply chain finance is deeply rooted in environmental and economic factors, with a focus on minimizing the carbon footprint and making supply chains more sustainable through financial strategies.

The green cluster focuses on technological and financial innovations, such as "blockchain," "artificial intelligence," and "financial system." These terms indicate a strong interest in how advanced technologies are being integrated into sustainable finance and supply chain management. Blockchain, for instance, is frequently associated with improving supply chain transparency and reducing inefficiencies. Artificial intelligence (AI) is increasingly seen as a tool to optimize operations, enhance decision-making, and promote sustainability in supply chains through better risk and resource management. The blue cluster represents economic aspects of sustainable finance, with terms like "investments," "economic development," and "risk assessment." These concepts highlight how sustainable supply chain finance is not only concerned with environmental and technological factors but also heavily influenced by economic considerations. Investment in sustainable projects, along with evaluating financial risks, is vital to ensuring that sustainable supply chains are both profitable and resilient in the long term.

Meanwhile, the yellow cluster is dedicated to "green finance," "sustainable finance," and related terms like "digital leadership" and "supply chain resilience." This part of the network reflects the growing emphasis on green finance as a key enabler of sustainability, where financial strategies align with environmental goals. The focus on resilience indicates that research is increasingly addressing how supply chains can adapt to disruptions, particularly in the face of climate change and other global challenges. The link to digital leadership shows the role of technology and digital governance in advancing green finance initiatives.

3.2 Overlay Visualization

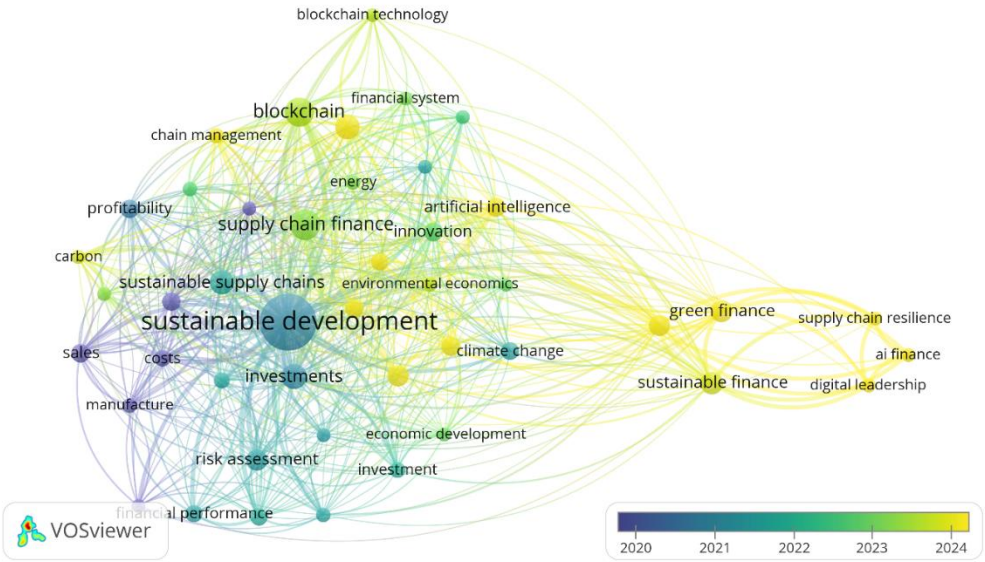

Figure 2. Overlay Visualization

Source: Data Analysis Result, 2026

Figure 2 shows the evolution of the key terms in the field of sustainable supply chain finance research over time, from 2020 to 2024. The color gradient in the bottom right corner indicates the timeline, with older terms marked in purple and more recent ones in yellow. The central node "Sustainable Development" remains a constant focus, surrounded by clusters of terms related to environmental, financial, and technological aspects of sustainable supply chains. Notably, the green and yellow clusters have evolved significantly over time. The yellow cluster, which includes terms like "green finance," "sustainable finance," and "supply chain resilience," has grown in prominence, reflecting the increasing importance of financial mechanisms that align with sustainability goals. These terms have emerged in recent years as the field of green finance has gained traction. The focus on supply chain resilience, in particular, underscores the growing attention to ensuring that supply chains can withstand disruptions, particularly in the context of climate change and global economic uncertainties.

Meanwhile, the purple and blue clusters, representing earlier terms like "carbon," "profitability," and "sustainable supply chains," have faded somewhat as the research has shifted toward newer technologies and financial strategies. Terms like "blockchain," "artificial intelligence," and "innovation" are now more prominently featured, reflecting how technological advancements are increasingly integrated into the pursuit of sustainability in supply chains. This trend indicates that researchers are focusing on how digital technologies can enhance transparency, efficiency, and resilience in sustainable supply chains, marking a shift toward innovation and tech-driven solutions in recent studies.

3.3 Citation Analysis

Table 1. The Most Impactful Literatures

Citations	Authors and year	Title
423	Di Vaio, A., Varriale, L. (2020)	Blockchain technology in supply chain management for sustainable performance: Evidence from the airport industry
363	Moosavi, J., Fathollahi-Fard, A.M., Dulebenets, M.A. (2022)	Supply chain disruption during the COVID-19 pandemic: Recognizing potential disruption management strategies

Citations	Authors and year	Title
328	Miroshnychenko, I., Barontini, R., Testa, F. (2017)	Green practices and financial performance: A global outlook
279	Nyström, M., Jouffray, J.-B., Norström, A.V., ... Galaz, V., Folke, C. (2019)	Anatomy and resilience of the global production ecosystem
266	Agrawal, R., Agrawal, S., Samadhiya, A., ... Luthra, S., Jain, V. (2024)	Adoption of green finance and green innovation for achieving circularity: An exploratory review and future directions
234	Soni, G., Kumar, S., Mahto, R.V., ... Mittal, M.L., Lim, W.M. (2022)	A decision-making framework for Industry 4.0 technology implementation: The case of FinTech and sustainable supply chain finance for SMEs
224	Bui, T.-D., Tsai, F.M., Tseng, M.-L., ... Yu, K.D.S., Lim, M.K. (2021)	Sustainable supply chain management towards disruption and organizational ambidexterity: A data driven analysis
201	Li, S., Jayaraman, V., Paulraj, A., Shang, K.-C. (2016)	Proactive environmental strategies and performance: Role of green supply chain processes and green product design in the Chinese high-tech industry
192	Petrick, I.J., Echols, A.E. (2004)	Technology roadmapping in review: A tool for making sustainable new product development decisions
182	Yu, Y., Zhang, J.Z., Cao, Y., Kazancoglu, Y. (2021)	Intelligent transformation of the manufacturing industry for Industry 4.0: Seizing financial benefits from supply chain relationship capital through enterprise green management

Source: Scopus, 2025

3.4 Density Visualization

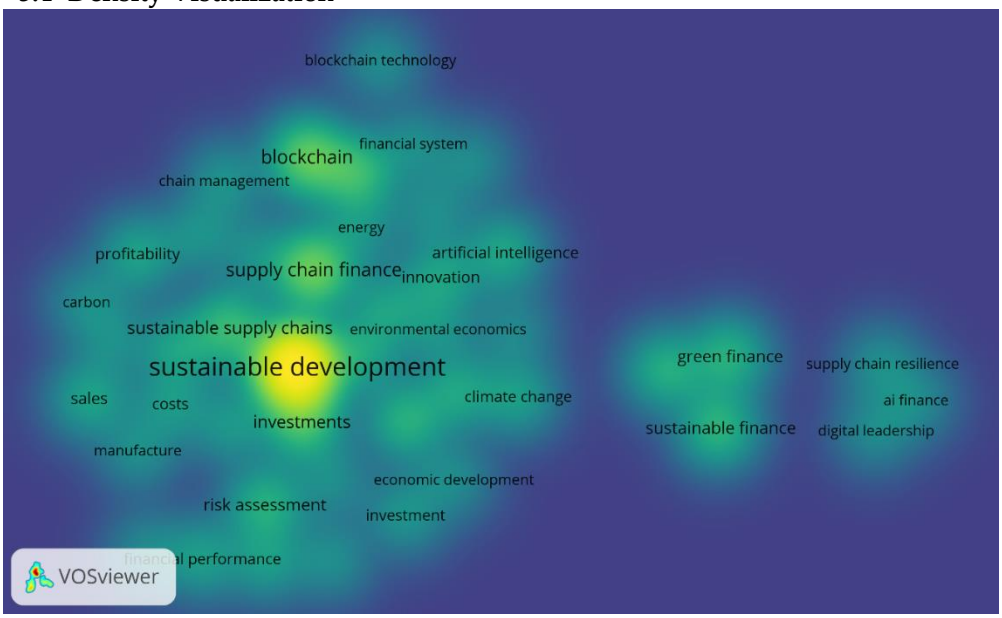

Figure 3. Density Visualization

Source: Data Analysis Result, 2026

Figure 3 highlights the concentration of research topics in sustainable supply chain finance, with the intensity of color representing the frequency or significance of these terms in the literature. The central term, “Sustainable Development,” is the most prominent, surrounded by key themes like “supply chain finance,” “sustainable supply chains,” and “investments.” The cluster around "sustainable development" suggests that it remains the primary focal point in the field, indicating that many studies explore the intersection of financial mechanisms and sustainability. The heatmap also reveals the growing importance of topics such as “green finance,” “sustainable finance,” and “supply chain resilience,” which are clustered towards the right side of the map. This indicates an increasing focus on financial strategies aimed at promoting sustainability and resilience in supply chains. The presence of terms like "blockchain," "artificial intelligence," and "digital leadership" shows the ongoing integration of technology in research, reflecting the growing role of digital solutions in enhancing the effectiveness of sustainable supply chain finance.

3.5 Co-Authorship Network

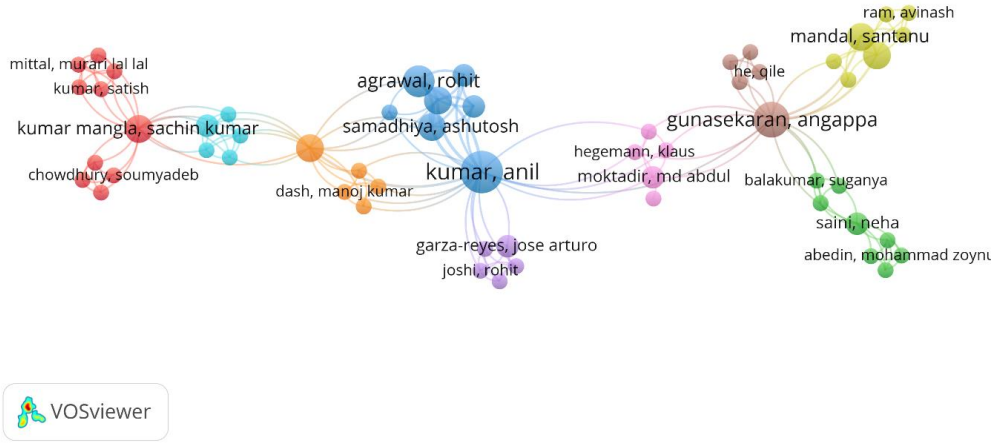

Figure 4. Author Visualization
Source: Data Analysis Result, 2026

Figure 4 depicts the collaboration patterns between different researchers in the field of sustainable supply chain finance. The colored clusters represent distinct groups of co-authors, with each cluster focusing on specific research themes. The central node, "Kumar, Anil," acts as a key connector within the network, linking several other researchers, such as "Agrawal, Rohit" and "Samadhiya, Ashutosh," forming a prominent blue cluster. The spread of nodes across different colors suggests diverse research areas, with some groups, like the red cluster, centered around researchers such as "Kumar Mangla, Sachin Kumar," and others, like the green cluster, connected to "Abedin, Mohammad Zoynul." The network reflects the collaborative nature of research, showing the interrelationships between scholars who are contributing to the growing body of knowledge in sustainable supply chain finance.

Figure 5. Affiliation Visualization
Source: Data Analysis Result, 2026

Figure 5 shows the collaboration between various universities and institutions in the field of sustainable supply chain finance research. The nodes represent different academic institutions, with colors denoting different clusters of collaboration. The central cluster includes universities such as "Amrita School of Business, Coimbatore, TN, India" and "London Metropolitan University, London, United Kingdom," indicating their central role in the network. Other nodes, like "Chandigarh University, Mohali, PB, India" and "Anhui University of Finance and Economics (UNEC), B," are connected, suggesting academic collaborations across different regions. This network illustrates the global reach of research in this field, spanning institutions from India, the United Kingdom, Azerbaijan, and the United Arab Emirates, and highlights the diverse academic contributions to sustainable supply chain finance.

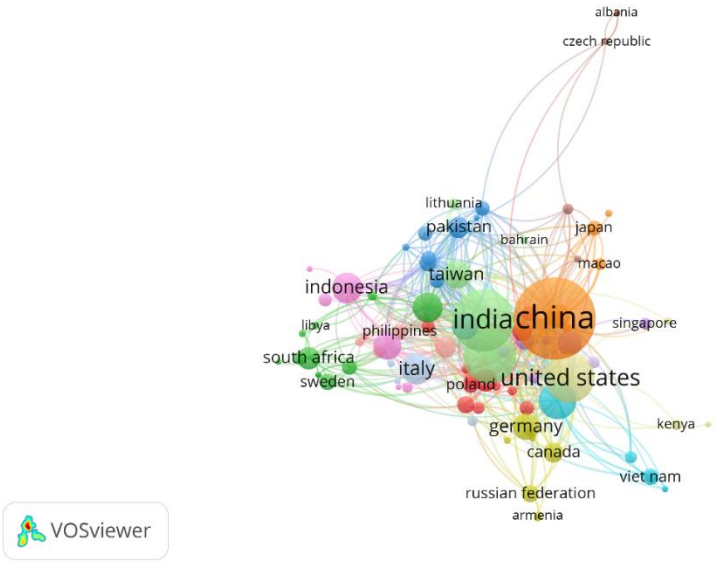

Figure 6. Country Visualization
Source: Data Analysis Result, 2026

Figure 6 illustrates the global distribution of research collaboration in the field of sustainable supply chain finance. The nodes represent countries, and their sizes indicate the intensity of research activity or collaboration. India, China, and the United States are the largest nodes, highlighting their central roles in this field, with dense networks connecting them to other regions. Countries like Indonesia, South Africa, Germany, and Italy form significant clusters, suggesting that research in sustainable supply chain finance is widespread across diverse geographical regions. The visualization also shows connections to countries like Japan, Taiwan, and Poland, indicating an international collaboration in this research domain. The varying colors of the clusters reflect different regional networks, with connections between countries that suggest active research partnerships and knowledge sharing across continents.

Discussion

The bibliometric analysis of sustainable supply chain finance research highlights the dynamic and rapidly evolving nature of this field. The central theme, "sustainable development," underscores the increasing importance of integrating financial strategies with sustainability goals, a trend that has gained traction in recent years. This is reflected in the rising prominence of concepts such as "green finance" and "sustainable finance," which emphasize the alignment of financial mechanisms with environmental objectives. The growing interest in these areas, particularly in countries like India, China, and the United States, signals a global recognition of the need to adopt sustainable practices in supply chain management. This shift is further supported by the integration

of advanced technologies, such as blockchain and artificial intelligence, which are being explored for their potential to enhance sustainability and efficiency within supply chains.

The geographical distribution of research also provides valuable insights into global collaboration patterns. The prominent role of countries like India, China, and the United States, along with active contributions from regions like Europe and Southeast Asia, reflects a broad international commitment to addressing sustainability challenges in supply chains. These findings suggest that while certain countries are leading in research output, there is a growing recognition worldwide of the need for sustainable finance practices. The increasing collaboration between researchers from different regions, as shown by the interconnected nodes in the visualization, points to the shared global effort to develop solutions for sustainable supply chains. This highlights the importance of cross-border knowledge exchange and collaboration in addressing the complexities of sustainability.

Despite the progress, several gaps in the research landscape remain. For instance, while technological advancements like blockchain and AI are gaining attention, their practical implementation in sustainable supply chain finance remains limited. Further research is needed to explore how these technologies can be effectively integrated into real-world supply chains. Additionally, while countries like India and China are contributing significantly to the field, there is a need for more inclusive research that incorporates perspectives from other developing nations, particularly those in Africa and Latin America. These regions are often underrepresented in the research, despite being key players in global supply chains. Bridging these gaps will be essential for advancing sustainable supply chain finance research and ensuring that solutions are applicable and effective across diverse global contexts.

CONCLUSION

This bibliometric analysis of sustainable supply chain finance research reveals a rapidly growing and interconnected global effort to integrate sustainability with financial strategies in supply chains. The central role of "sustainable development" highlights the shift towards aligning financial practices with environmental and social goals, supported by emerging technologies like blockchain and artificial intelligence. The geographical distribution of research underscores a diverse and widespread international commitment, with significant contributions from countries like India, China, and the United States, alongside growing engagement from regions such as Southeast Asia and Europe. However, gaps remain, particularly in the practical application of advanced technologies and the inclusion of underrepresented regions in the research landscape. Addressing these gaps will be crucial for advancing the field and ensuring that sustainable supply chain finance solutions are effective, equitable, and globally applicable.

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