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Supply Chain Management: A Bibliometric Mapping of Research Clusters and Scholarly Influence

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ABSTRACT

This study aims to map the intellectual structure and scholarly influence of Supply Chain Management research through a bibliometric approach. Data were collected from the Scopus database and analyzed using VOSviewer to examine keyword co-occurrence, co-citation networks, and thematic evolution. The results reveal that supply chain management remains a central and highly interconnected research domain, with major clusters encompassing sustainability, digital transformation, risk management, and operational performance. Overlay visualization indicates a temporal shift from traditional themes such as risk assessment and operational efficiency toward emerging topics including artificial intelligence, blockchain, machine learning, and Industry 4.0. Density analysis further highlights that while core concepts such as supply chain management and decision making are well-established, newer areas related to digital technologies and sustainability continue to gain traction. The study also identifies influential scholarly contributions and global research patterns, reflecting the increasing interdisciplinarity of the field. The findings suggest that contemporary SCM research is transitioning toward a more integrated paradigm that combines technological innovation, environmental sustainability, and strategic competitiveness. This study contributes by providing a comprehensive overview of research clusters and offering directions for future studies in advancing resilient and sustainable supply chains.

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1. INTRODUCTION

In the contemporary global economy, supply chain management (SCM) has become a fundamental component of organizational competitiveness and operational efficiency. The concept of SCM refers to the integrated management of activities involved in sourcing raw materials, transforming them into finished products, and delivering those products to end customers through coordinated networks of suppliers, manufacturers, distributors, and retailers [1], [2]. This process involves the

management of material flows, information flows, and financial transactions across multiple organizations and geographic boundaries. Effective supply chain management enables organizations to optimize resource utilization, reduce operational costs, improve service quality, and respond more rapidly to market changes [3]. As global markets expand and technological innovations accelerate, supply chains are becoming increasingly complex, necessitating advanced coordination and strategic collaboration among stakeholders.

The growing complexity of global production networks has significantly increased the importance of research in supply chain management. Organizations are no longer competing as individual firms but as interconnected supply chain systems, where the performance of one entity influences the performance of others. Consequently, SCM research has expanded across multiple disciplines, including operations management, logistics, information systems, sustainability, and strategic management. Modern supply chains integrate digital technologies such as artificial intelligence, blockchain, and data analytics to improve transparency, traceability, and decision-making processes. These developments have encouraged scholars to examine various dimensions of supply chain operations, including resilience, sustainability, risk management, and technological innovation. The interdisciplinary nature of SCM research has resulted in a rapidly growing body of literature with diverse theoretical perspectives and methodological approaches [4], [5].

Over the past two decades, the volume of academic publications related to supply chain management has increased significantly, reflecting its strategic importance for both researchers and practitioners. The expansion of SCM research has been influenced by major global events and emerging technological trends. For example, disruptions caused by global crises such as the COVID-19 pandemic highlighted the vulnerability of supply networks and intensified scholarly interest in supply chain resilience and risk management. At the same time, the growing emphasis on sustainability and environmental responsibility has stimulated research on green supply chain management and circular economy practices. These developments demonstrate how supply chain research continues to evolve in response to real-world challenges and technological advancements [6], [7]. Bibliometric studies also indicate that the number of publications in the supply chain domain has increased steadily in recent years, particularly after 2020, as researchers sought to understand the impact of disruptions on global logistics systems.

Given the rapid expansion of the literature, scholars increasingly rely on bibliometric analysis to systematically map the intellectual structure of a research field. Bibliometric methods allow researchers to examine patterns of publication, citation relationships, co-authorship networks, and keyword co-occurrence to identify major research themes and influential scholars. Through techniques such as citation analysis, co-citation analysis, and science mapping, bibliometric studies provide insights into the development of knowledge within a particular domain. These methods help identify dominant research clusters, emerging topics, and influential academic contributions that shape the direction of future studies. In the context of supply chain management, bibliometric approaches have been used to explore various specialized topics such as green supply chains, supply chain resilience, digital transformation, and supply chain innovation. Such analyses provide a structured overview of how the field has evolved over time and which research areas have received the greatest scholarly attention.

Despite the increasing number of bibliometric studies in supply chain management, there remains a need for comprehensive mapping of research clusters and scholarly influence across the broader SCM literature. Many existing studies focus on

specific subtopics or limited time periods, leaving gaps in understanding the overall intellectual structure of the field. Furthermore, identifying influential authors, institutions, and research themes is essential for guiding future research directions and supporting the development of theoretical frameworks in supply chain management. By analyzing citation networks and thematic clusters within the literature, scholars can gain a clearer understanding of how knowledge in the field is organized and how different research streams interact. Therefore, conducting a bibliometric mapping of supply chain management research is essential for providing a systematic overview of the field and identifying the key contributors who have shaped its development.

Although supply chain management has become one of the most widely studied topics in business and operations research, the rapid growth of publications has created challenges for scholars seeking to understand the intellectual structure and dominant research themes within the field. The large volume of literature makes it difficult to identify influential studies, major research clusters, and the relationships among different streams of knowledge. While several bibliometric analyses have been conducted on specific areas such as green supply chains, resilience, or technological integration, there is still limited research that comprehensively maps the broader landscape of supply chain management scholarship. Consequently, there is a need for systematic bibliometric analysis that can identify key research clusters, evaluate scholarly influence, and reveal the evolution of research trends within the supply chain management domain.

The objective of this study is to conduct a bibliometric mapping of supply chain management research in order to identify major research clusters and evaluate scholarly influence within the field.

2. METHODS

This study employs a bibliometric analysis approach to examine the intellectual structure and development of research in supply chain management. Bibliometric analysis is a quantitative research method used to evaluate patterns in academic publications through statistical analysis of bibliographic data such as authorship, citations, keywords, and publication sources. This method enables researchers to systematically map the evolution of a scientific field and identify influential contributions within the literature. In this study, bibliometric techniques are used to explore publication trends, scholarly influence, and thematic research clusters related to supply chain management. By analyzing relationships among articles, authors, and keywords, the study provides a structured overview of the knowledge landscape and identifies the dominant research themes that have shaped the development of supply chain management scholarship.

The data for this study were collected from a reputable academic database that indexes peer-reviewed journals in business, management, and operations research. Relevant publications were identified using search keywords related to "supply chain management" within article titles, abstracts, and keywords. To ensure the quality and relevance of the dataset, only scholarly articles and review papers published in peer-reviewed journals were included, while conference papers, book chapters, and non-academic publications were excluded. The selected documents were then exported in a bibliographic format containing information such as authors, titles, abstracts, keywords, citations, and publication sources. After the initial data collection process, the dataset was screened and refined to remove duplicates and unrelated records, resulting in a final dataset suitable for bibliometric analysis.

3. RESULT AND DISCUSSION

3.1 Citation Analysis

Table 1. Top Cited Literature

Citations	Authors and year	Title	Source
4,943	[8]	From a literature review to a conceptual framework for sustainable supply chain management	Journal of Cleaner Production, 16(15), pp. 1699–1710
3,417	[9]	Information distortion in a supply chain: The bullwhip effect	Management Science, 43(4), pp. 546–558
3,344	[10]	Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy	International Journal of Information Management, 57, 101994
3,272	[11]	Defining supply chain management	Journal of Business Logistics, 22(2), pp. 1–25
3,195	[12]	Blockchain technology and its relationships to sustainable supply chain management	International Journal of Production Research, 57(7), pp. 2117–2135
3,166	[13]	Green supply-chain management: A state-of-the-art literature review	International Journal of Management Reviews, 9(1), pp. 53–80
3,079	[14]	A framework of sustainable supply chain management: Moving toward new theory	International Journal of Physical Distribution & Logistics Management, 38(5), pp. 360–387
2,635	[15]	The impact of supply chain integration on performance: A contingency and configuration approach	Journal of Operations Management, 28(1), pp. 58–71

Source: Scopus Database

3.2 Keyword Co-Occurrence Network Visualization

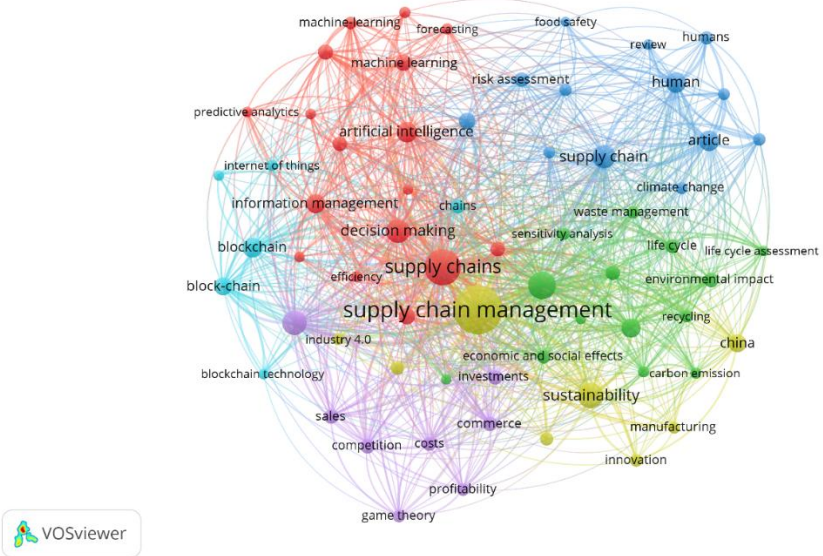

Figure 1. Network Visualization

Source: Data Analysis

Figure 1 reveals a dense and interconnected intellectual structure within the field of Supply Chain Management. At the center of the map, the dominant keyword "supply chain management" appears as the largest node, indicating its foundational role and high frequency in the literature. Its central position and extensive linkages with surrounding nodes suggest that it serves as the core integrative concept, connecting multiple thematic areas such as sustainability, digitalization, and decision-making processes. This centrality reflects the multidisciplinary nature of SCM research and its evolution as a strategic domain across industries.

The red cluster highlights a strong concentration of research related to digital transformation, particularly the integration of technologies such as artificial intelligence, machine learning, and predictive analytics. Keywords like "artificial intelligence," "machine learning," "forecasting," and "decision making" indicate a growing emphasis on data-driven supply chain optimization. This cluster suggests that recent SCM studies are increasingly leveraging advanced analytics and intelligent systems to improve efficiency, forecasting accuracy, and operational responsiveness. The presence of "internet of things" and "blockchain" further reinforces the shift toward Industry 4.0-driven supply chains.

The green cluster represents sustainability-oriented research, which has become a dominant theme in recent years. Terms such as "sustainability," "environmental impact," "carbon emission," "life cycle assessment," and "waste management" indicate a strong focus on environmentally responsible supply chain practices. This cluster reflects the growing importance of integrating environmental and social considerations into supply chain decision-making. The inclusion of "economic and social effects" suggests that sustainability research in SCM is not limited to environmental aspects but also encompasses broader socio-economic implications, aligning with global sustainability agendas and ESG frameworks.

The blue cluster appears to focus on human, risk, and systemic aspects of supply chains. Keywords such as "human," "risk assessment," "food safety," and "review" indicate research streams related to governance, safety, and risk management. This cluster highlights the importance of human factors and regulatory considerations in supply chain operations. The presence of "climate change" also connects this cluster to broader environmental risks, suggesting an intersection between risk management and sustainability concerns within SCM research.

The purple and yellow clusters emphasize economic performance and strategic decision-making dimensions. Keywords like "costs," "profitability," "competition," "commerce," and "innovation" reflect traditional operational and financial perspectives in supply chain research. The appearance of "game theory" indicates the use of analytical and strategic modeling approaches to understand competitive dynamics and decision-making behavior. Meanwhile, terms such as "manufacturing" and "investments" suggest a continued focus on industrial applications and capital allocation within supply chains.

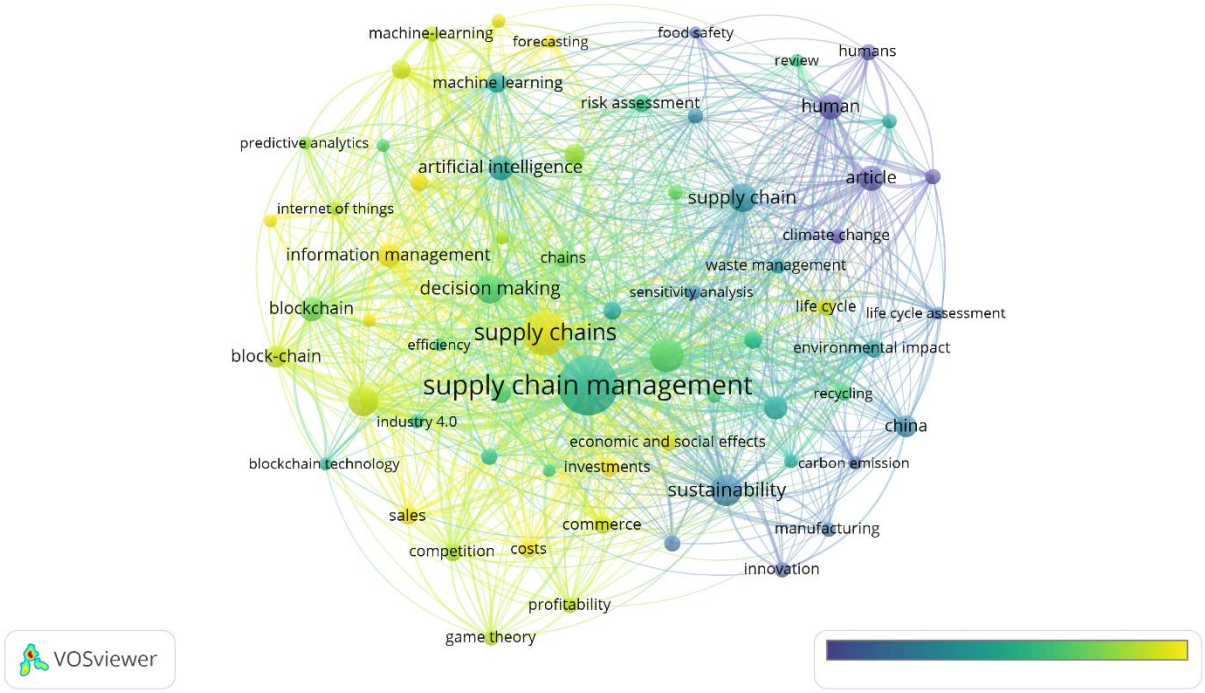

Figure 2. Overlay Visualization
Source: Data Analysis

Figure 2 illustrates the temporal evolution of research themes within Supply Chain Management. The color gradient from blue (earlier studies) to yellow (more recent studies) highlights how the focus of SCM research has shifted over time. Core terms such as "supply chain management" and "supply chains" appear in green, indicating their consistent relevance across different periods. This suggests that while the foundational concepts of SCM remain stable, the surrounding research themes continue to evolve dynamically in response to technological, environmental, and economic changes.

Earlier research, represented by blue tones, tends to focus on traditional and foundational topics such as "human," "article," "risk assessment," "food safety," and "life cycle assessment." These themes reflect an initial emphasis on operational processes, safety, and basic risk management within supply chains. Additionally, environmental topics such as "climate change" and "environmental impact" also appear in earlier phases, indicating that sustainability concerns were already present but not yet central. This stage of research can be interpreted as laying the groundwork for more specialized and integrated approaches in later years.

In contrast, more recent research, indicated by yellow tones, shows a strong shift toward digitalization and advanced analytical approaches. Keywords such as "artificial intelligence," "machine learning," "blockchain," "internet of things," and "industry 4.0" dominate the newer spectrum, signaling the transformation toward smart and data-driven supply chains. Alongside this, economic and strategic themes like "profitability," "competition," and "commerce" also emerge as recent interests, suggesting a growing integration between technological innovation and business performance.

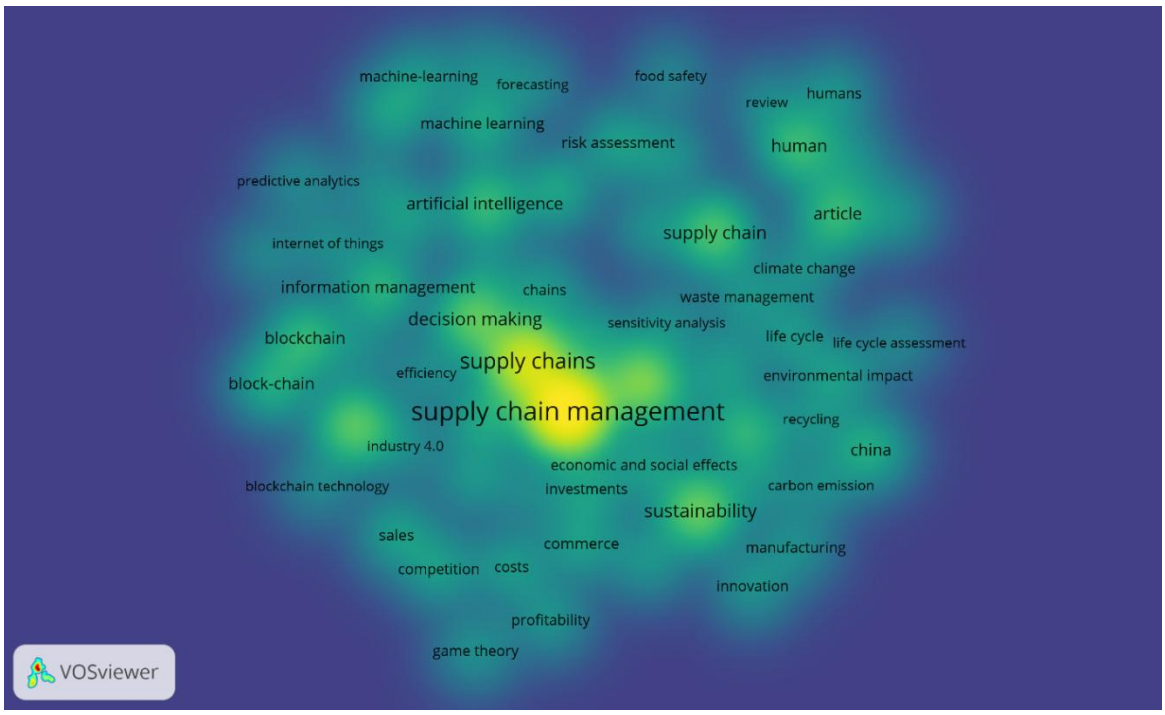

Figure 3 Density Visualization

Source: Data Analysis

Figure 3 highlights the concentration and intensity of research topics within Supply Chain Management. The brightest (yellow) areas indicate the most frequently studied and highly connected themes, with "supply chain management" and "supply chains" emerging as the central core of the research landscape. Surrounding this core are closely related concepts such as "decision making," "information management," and "sustainability," which appear in green-to-yellow shades, suggesting they are well-developed and actively researched areas. This concentration reflects that SCM research is strongly anchored in operational coordination and strategic management, while increasingly integrating sustainability considerations.

In contrast, areas with cooler colors (green to blue), such as "blockchain technology," "industry 4.0," "machine learning," "artificial intelligence," and "game theory," represent emerging or less densely studied topics. Although these themes are not yet as dominant as the core topics, their presence indicates growing scholarly interest, particularly in digital transformation and advanced analytical approaches. Similarly, topics like "carbon emission," "life cycle assessment," and "environmental impact" show moderate density, suggesting that sustainability research is expanding but still evolving.

Discussion

The findings of this bibliometric study reveal that research in Supply Chain Management has evolved into a highly interconnected and multidisciplinary domain. The centrality of "supply chain management" and "supply chains" across all visualizations confirms that the field maintains a strong conceptual core while continuously expanding into new thematic areas. The cluster visualization demonstrates that SCM research is no longer confined to operational efficiency, but has diversified into multiple domains including digital transformation, sustainability, and strategic decision-making. This reflects the

increasing complexity of global supply chains and the need for integrated approaches that combine technological, environmental, and managerial perspectives.

A key insight from the cluster and overlay analyses is the rapid rise of digitalization as a dominant research trajectory. The prominence of keywords such as artificial intelligence, machine learning, blockchain, and the internet of things indicates a paradigm shift toward data-driven and intelligent supply chains. This transformation aligns with the broader Industry 4.0 movement, where real-time data, automation, and predictive analytics enhance supply chain responsiveness and efficiency. From a theoretical perspective, this shift can be interpreted through the lens of dynamic capabilities, where organizations leverage digital technologies to sense, seize, and transform their operations in response to environmental changes. The increasing integration of these technologies suggests that future SCM research will continue to emphasize digital innovation as a source of competitive advantage.

In parallel, sustainability has emerged as a critical and enduring theme within SCM research. The presence of keywords such as sustainability, environmental impact, carbon emission, and life cycle assessment highlights the growing importance of environmentally and socially responsible supply chain practices. The density visualization indicates that sustainability-related topics are well-developed but still expanding, suggesting ongoing scholarly interest in integrating ESG principles into supply chain strategies. This trend reflects increasing regulatory pressures, stakeholder expectations, and global challenges such as climate change. The convergence of sustainability and supply chain management also supports the application of institutional theory, where organizations adopt sustainable practices to gain legitimacy and align with societal norms.

Another important dimension identified in this study is the continued relevance of economic and strategic considerations in SCM research. Clusters related to costs, profitability, competition, and commerce indicate that traditional performance-oriented perspectives remain integral to the field. However, the integration of these themes with digitalization and sustainability suggests a shift toward a more holistic understanding of supply chain performance. Rather than focusing solely on cost efficiency, contemporary research emphasizes value creation through innovation, resilience, and sustainability. The inclusion of analytical approaches such as game theory further indicates the use of advanced models to understand strategic interactions among supply chain actors.

4. CONCLUSION

This study provides a comprehensive bibliometric mapping of Supply Chain Management, revealing a dynamic and evolving research landscape characterized by the convergence of traditional operational themes with emerging domains such as digitalization and sustainability. The findings highlight that while the core of SCM remains centered on coordination and efficiency, recent research trends increasingly emphasize the integration of advanced technologies, environmental responsibility, and strategic value creation. The identification of key research clusters and influential scholarly contributions demonstrates the growing complexity and interdisciplinarity of the field. This study contributes to the literature by offering a structured understanding of the intellectual development of SCM and provides a foundation for future research to further explore the intersection of technological innovation, sustainability, and supply chain resilience.

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