Mapping The Landscape of Supply Chain Risk Management: A VOSviewer-Based Bibliometric Study

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Abstract. Since the concept of supply chain risk has received widespread attention, supply chain risk management has become a key topic of academic discussion. This study focuses on the literature analysis of supply chain risk management. VOSviewer software was used to conduct a bibliometric analysis of the literature in this field, including keyword co-occurrence analysis, country collaboration network analysis, author co-occurrence network analysis, and document co-citation analysis. The analysis results show that research in the field of supply chain risk management was initially dominated by American scholars. Around 2018, scholars from China, India, and Canada began to significantly increase their research investment in this field. Since 2021, China has become the major contributing country in terms of publication volume in this field. The analysis of the thematic evolution of supply chain risk management reveals that early research focused more on themes such as supply chain vulnerability, risk identification, and assessment; subsequently, it gradually expanded to areas such as supply chain resilience, disruption management, and sustainable supply chains. In recent years, digital risks, artificial intelligence applications, blockchain technology, climate-related risks, and risk management in the context of the circular economy have become emerging research themes.

Keywords: Supply Chain Risk Management, Bibliometrics, Research Evolution, Collaboration Network

1 Introduction

The concept of supply chain risk has become increasingly prominent with the globalization and development of complex supply chain networks. As business operations increasingly rely on cross-regional, multi-tiered supply chain systems, the vulnerability and potential disruptions within supply chains have made risk management a widely discussed term in the fields of operations management and strategy (Tang & Musa, 2011). Over the first two decades of the 21st century, supply chain risk management has often been discussed alongside terms such as efficiency and cost, referring to the control of risk costs while ensuring supply chain continuity. However, this approach has frequently shown limitations in responding to major unexpected events (Wagner & Bode, 2008). Subsequently, scholars have infused the concept of supply chain risk

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management with more systematic implications, arguing that it essentially involves enhancing the adaptability and resilience of supply chains in dynamic environments through collaborative strategies. This has contributed to its widespread acceptance in both academic and corporate practices.

With the development of supply chain risk management theory and practice, its research scope has expanded to cover multiple critical areas, such as global supply chains, food supply chains, healthcare supply chains, and manufacturing supply chains. Research on supply chain risk management has attracted significant attention from scholars and industry practitioners worldwide. From the existing literature, it is evident that scholars are currently focusing on sub-fields such as supply chain resilience building (Ivanov & Dolgui, 2020), digital supply chain risk (Naseem & Yong, 2025), and the intersection of sustainability and risk (Yazdani et al., 2021). Digital technologies such as artificial intelligence and blockchain are becoming increasingly embedded in supply chain risk management research(Salehi et al., 2025; Abdullah et al., 2024). However, systematic reviews and evolutionary analyses of the overall research landscape of supply chain risk management remain relatively limited. Bibliometric methods enable large-scale literature clustering and network analysis of specific disciplinary fields, revealing the knowledge structure and dynamic evolution paths of the domain. Recent methodological advancements in bibliometric analysis have further enhanced the capacity to capture emerging research trends and interdisciplinary influences (Fang et al., 2022; Thompson et al., 2025). Therefore, this study applies bibliometric analysis to identify the development trends in supply chain risk management research, aiming to uncover the key drivers and research frontiers behind the evolution of research topics in this field.

In this study, VOSviewer (Van Eck & Waltman, 2010)10 is primarily used to extract, analyze, and visualize bibliographic information from relevant literature. Based on a systematic analysis of the sample literature information, this research seeks to address the following three questions in the field of supply chain risk management: First, what are the characteristics of collaboration networks among scholars and countries in existing research? Second, based on keyword co-occurrence and evolutionary analysis, what is the current distribution of research hotspots, and what are the potential future research trends? Finally, which countries have significant academic influence in the field of supply chain risk management? To this end, the study is divided into three main parts: first, the methods and data sources used in the research are explained; second, the results of literature collection and bibliometric analysis, along with their visualizations, are presented; and finally, the main research findings and implications are discussed based on the data analysis results.

2 Metadata Set Obtaining and Analyzing

In this study, the Web of Science (WOS) Core Collection database was used as the source of publication data. Using the search query TS=("supply chain risk management"), a search was conducted on January 5, 2026, covering the time span from 1995 to 2026, which initially yielded 8,780 published works.

To ensure the scientific rigor and accuracy of the research, further refinement was performed on the retrieved 8,780 publications. Due to the substantial number of Chinese scholars in the dataset, manual verification and correction of authors' names were subsequently carried out. Scholars with identical names but different surnames were refined and annotated. This dataset includes article titles, publication years, journals, authors, abstracts, keywords, citation counts, as well as the institutions of the researchers.

Subsequently, a bibliometric analysis was conducted using VOSviewer (Van Eck & Waltman, 2010). The analysis comprised four main components: keyword co-occurrence analysis to identify research hotspots and their evolution; country collaboration network analysis to map geographical contributions and partnerships; author co-occurrence network analysis to identify leading researchers and research clusters; and document co-citation analysis to pinpoint seminal works and intellectual structures within the field.

3 Results

3.1 Analysis of the Annual Volume of Publications

To some extent, changes in the number of publications can clearly reflect the research intensity and interest in a particular topic (Wu Lingqian & Ma Haiqun, 2023). The sample dataset of this study includes a total of 8,780 publications, covering 118 countries, 3,438 organizations, and 20,283 authors. Figure 1 illustrates the annual trend in the number of articles from 1995 to 2025. Research on supply chain risk management first began in 1995, followed by slow growth in subsequent years. However, starting from 2017, the number of publications surged significantly, with 1,247 articles on supply chain risk management published in 2025 alone.

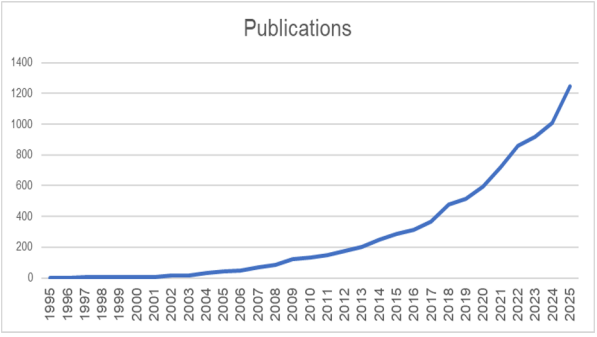

Fig. 1. Distribution of Supply Chain Risk Management research by publication year

3.2 Analysis of Major Research Countries/Regions

This study analyzes the collaboration among researchers in the field of supply chain risk management across different countries. Using the criterion of having published at

least five papers as the threshold, 81 out of the 118 countries met this standard and were included in the subsequent analysis. As shown in Figure 2, larger nodes in the graph indicate a higher number of publications from the corresponding country. The color bar in the lower-right corner of Figure 2 illustrates that countries with darker nodes have earlier publication years, while those with lighter nodes have more recent publications. In terms of the number of publications, China (2,140 articles, 24.4%) and the United States (1,298 articles, 14.8%) are the countries with the highest research output. Chronologically, scholars from the United States and Switzerland were among the first to focus on and enter the research domain of supply chain risk management, followed by scholars from Canada and Hong Kong, while Chinese scholars entered this field relatively later. In terms of total publication volume, China has become the major contributing country since 2021.

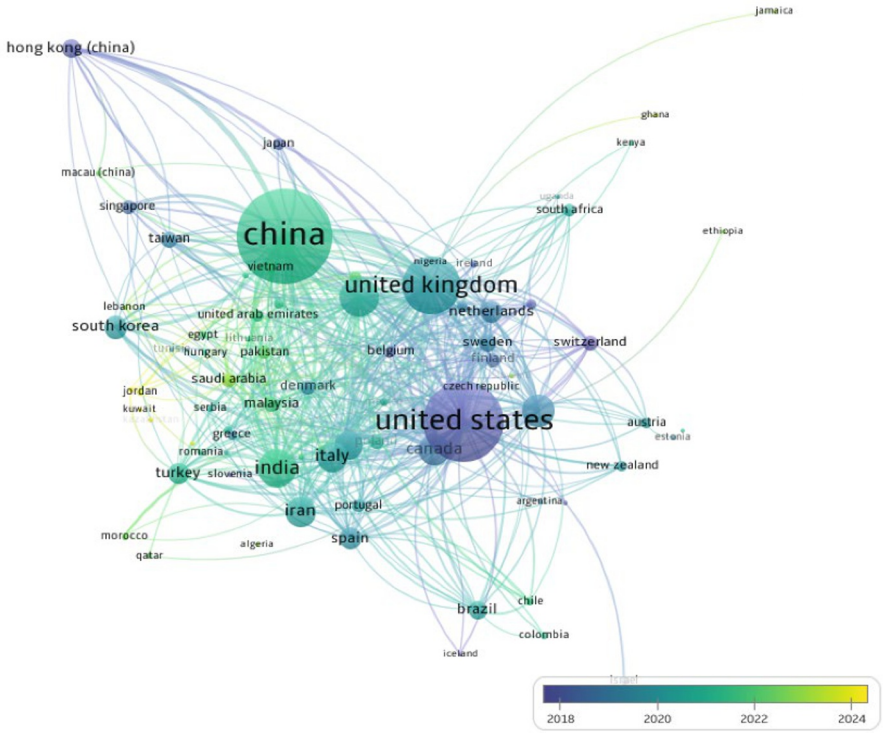

Fig. 2. Country Collaboration Network

3.3 Keyword Analysis and Trending Topics

The sample dataset for this study includes a total of 18,711 keywords. To simplify the visualization of the map, this study considers only keywords that appear in at least 10 publications, resulting in a final set of 500 keywords. The distribution of these keywords is illustrated in Figure 3.

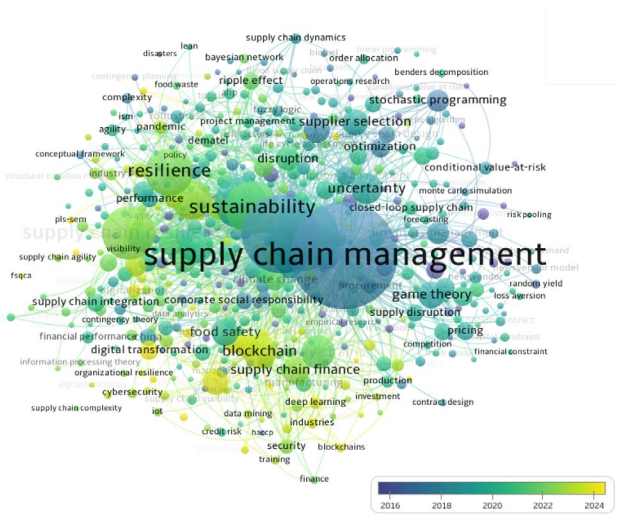

Fig. 3. keywords co-occurrence Network

From the keyword distribution map, it is evident that research topics in supply chain risk management exhibit distinct phase characteristics, with shifts often catalyzed by real-world events:

Early Stage (pre-2011): The focus was primarily on traditional risk areas such as natural disasters and food waste, employing traditional methods like Bayesian networks and stochastic programming. The 2011 Thailand floods, a major global supply chain disruption, served as a critical wake-up call, highlighting the vulnerability of tightly coupled global networks and subsequently intensifying research into supplier selection and order allocation.

Mid-Stage (2011-2019): Attention shifted toward modern risk challenges like supply chain disruptions. Concepts like resilience and sustainability became core. This shift was driven by a series of events including the 2011 Fukushima disaster and the increasing frequency of extreme weather events linked to climate change. Quantitative methods such as Monte Carlo simulation and risk pooling were widely adopted.

Recent Stage (2020-present): The field has entered a period of digital transformation. The COVID-19 pandemic was a singular event that exposed the fragility of global supply chains, accelerating research into resilience, viability, and disruption management. Concurrently, the implementation of regulations like the EU's General Data Protection Regulation (GDPR) and a surge in cyberattacks on critical infrastructure (e.g., the 2021 Colonial Pipeline attack) have propelled research into cybersecurity, blockchain, and the Internet of Things as new tools for risk management. The scope of management has expanded to include multi-risk collaborative management, digital risks, and organizational resilience.

Supply chain risk management research is evolving from traditional risk control toward a more intelligent, sustainable, and systematic direction. Digital technology, sustainable principles, and dynamic adaptability will serve as the core drivers of future research.

3.4 Analysis of Major Publishing Journals

In the Web of Science (WOS) database, there are a total of 1,280 journal sources publishing research in the field of supply chain risk management. The top 10 journals with the highest citation counts are listed in Table 1.

Table 1. Top 10 Cited Journals in Supply Chain Risk Management

Number	Journal	Articles	Citations
1	International Journal Of Production Research	420	30922
2	International Journal Of Production Economics	372	28994
3	Journal Of Cleaner Production	234	16678
4	European Journal Of Operational Research	213	14903
5	Supply Chain Management-An International Journal	183	14245
6	Transportation Research Part E-Logistics And Transportation Review	151	10908
7	International Journal Of Physical Distribution & Logistics Management	109	8796
8	Annals Of Operations Research	186	8795
9	Journal Of Operations Management	61	8733
10	Computers & Industrial Engineering	216	8461

3.5 Most Influential Publications

The top 10 most cited publications in supply chain risk management research are presented in Table 2.

Table 2. Top 10 Cited Publications in Supply Chain Risk Management

Rank	Year	First Author	WOS Citations
1	2008	*Seuring, S*	3822
2	2003	*Keating, BA*	2146
3	2006	*Tang, CS*	1545
4	2009	*Ponomarov, SY*	1397
5	2005	*Kleindorfer, PR*	1311
6	2004	*Chopra, S*	1282
7	2020	*Ivanov, D*	1224
8	2006	*Tomlin, B*	1168
9	2018	*Kshetri, N*	1134
10	2019	*Ivanov, D*	1131

According to Table 2, it can be observed that the core publication in this field is "From a literature review to a conceptual framework for sustainable supply chain management" published by Seuring, S in 2008. This article reviews 191 publications on sustainable supply chain management from 1994 to 2007, discussing the specific characteristics of sustainable supply chains and the limitations of existing research. The second most cited article is "An overview of APSIM, a model designed for farming

systems simulation" published by Keating, B.A. in 2003, which primarily examines the modular modeling framework APSIM developed by the Australian Agricultural Production Systems Research Unit.

3.6 Lead Researcher Analysis

This study includes 728 researchers who have published at least 5 papers related to supply chain risk management for further analysis. Based on the author co-occurrence network analysis in supply chain risk management, the field exhibits a diverse research network structure centered around key scholars. As shown in Figure 4, Ivanov, D emerges as a central scholar in the field, with the largest node located at the core of the network, indicating his significant influence in supply chain risk management research. Major research clusters have formed around Ivanov, D, while other key scholars such as Choi, T.M., Govindan, K, Seuring, S, and Paul, S.K. also constitute critical nodes. Notably, the figure reveals several Chinese scholars, including Zhang, N, Wang, S.Y., and Liu, F, highlighting the prominent position and substantial contributions of Chinese researchers in this field. The overall network reflects characteristics of international collaboration, with scholars from different countries forming connections, underscoring the globalized nature of supply chain risk management research.

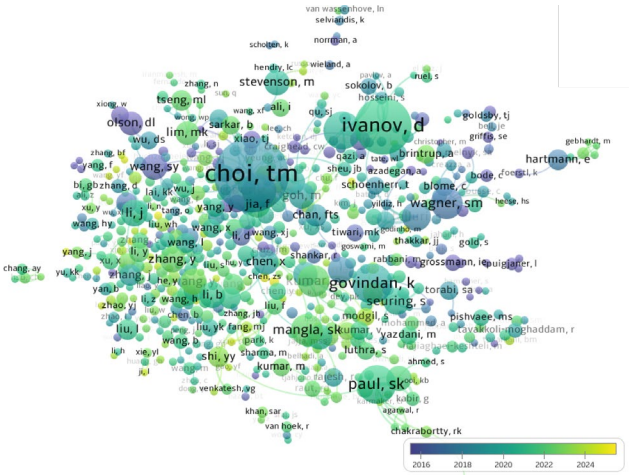

Fig. 4. Author Co-occurrence Network

3.7 Document Co-citation Analysis and Major Research Clusters

To identify the intellectual structure of the SCRM field, a document co-citation analysis was performed. A co-citation link between two documents is established when they are both cited by a third document. This analysis reveals the foundational works and the emergence of distinct research clusters. Parameter setting: A minimum threshold of 50 citations per cited reference was applied. Of the 277,017 cited references, 564 met this threshold and were included in the analysis.

The co-citation network visualization (Figure 5) revealed five primary research clusters:

Cluster 1 (Red): Supply Chain Resilience & Disruption Management. This is the largest cluster, centered around seminal works by Ivanov, D. (e.g., Ivanov, 2017, 2019,2020) and Hosseini, S. (2019). This cluster focuses on concepts of resilience, viability, and recovery strategies against major disruptions, such as the COVID-19 pandemic and natural disasters.

Cluster 2 (Blue): Sustainable Supply Chain Management. This cluster is anchored by the most highly cited paper in the field, Seuring, S. (2008). Research in this cluster integrates environmental and social dimensions into SCRM, exploring the intersection of sustainability and risk.

Cluster 3 (Green): Risk Assessment & Quantitative Modeling. This cluster features foundational works by Tang, C.S. (2006) and Kleindorfer, P.R. (2005). It is characterized by studies employing Bayesian networks, stochastic programming, and other quantitative methods for supplier selection, order allocation, and risk assessment.

Cluster 4 (Yellow): Digitalization & Emerging Technologies. This newly emerging cluster includes recent works by Kshetri, N. (2018) and Tomlin, B. (2006), focusing on the role of blockchain, AI, and IoT in mitigating supply chain risks such as cybersecurity threats and data integrity issues.

Cluster 5 (Purple): Supply Chain Integration & Relationship Management. This cluster is built around key contributions by Christopher, M. (2004), and Ponomarov, S.Y. (2009). It emphasizes supply chain collaboration, partnership governance, and risk sharing mechanisms, highlighting the relational perspective in mitigating risks through integration and coordination.

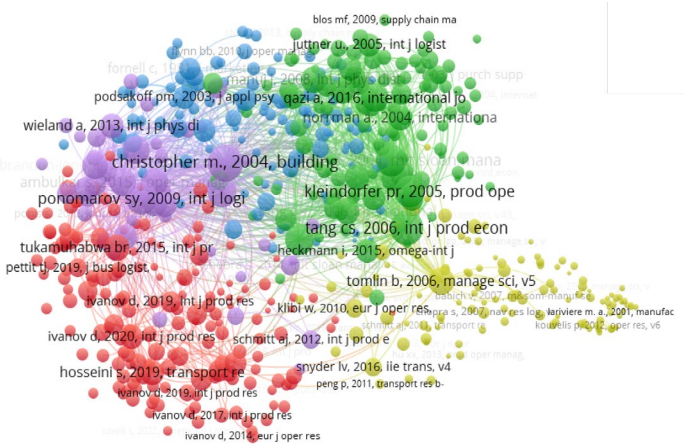

Fig. 5. Document Co-citation Network

This clustering analysis provides a more granular view of the field, confirming the evolution from traditional risk control (Cluster 3) towards integrated approaches that emphasize sustainability (Cluster 2), resilience (Cluster 1), digital transformation (Cluster 4), and relational collaboration (Cluster 5).

4 Conclusion

This study integrates bibliometric and statistical analysis of literature in the field of supply chain risk management from the Web of Science database from 1995 to 2026. The findings indicate:

(1) The number of publications in supply chain risk management has been increasing annually. Since around 2021, China has become the leading country in terms of publication volume in this field, although its influence and collaborative networks remain relatively limited.

(2) The distribution of journals publishing supply chain risk management literature is highly concentrated. The top ten journals ranked by publication quantity primarily focus on areas such as sustainable supply chain management.

(3) Research themes in supply chain risk management have evolved from traditional risk control toward intelligent, sustainable, and systemic approaches. Early studies emphasized supply chain vulnerability and risk assessment, mid-phase research shifted toward resilience and sustainability, while recent work has focused on emerging directions such as digital technologies (e.g., blockchain, artificial intelligence), multi-dimensional risk management, and dynamic adaptability. This evolution reflects the growing integration of digital innovation and climate-related considerations into mainstream SCRM research (Chen et al., 2025; Pungula, 2024).

As digital transformation accelerates and global supply chains grow increasingly complex, the importance of supply chain risk management continues to rise. Therefore, it is essential not only for scholars in this field but also for all enterprises and managers involved in supply chain operations to prioritize risk management. Doing so will help ensure the long-term stability of supply chains and promote sustainable corporate development.

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