

# BIBLIOMETRIC REVIEW ON SUPPLY CHAIN RISK MANAGEMENT

REVISÃO BIBLIOMÉTRICA SOBRE GESTÃO DE RISCOS NA CADEIA DE  
SUPRIMENTOS

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## **ABSTRACT**

Supply chain risk management (SCRM) has gained increasing relevance due to the growing complexity, globalization, and vulnerability of supply chains to disruptive events. Over recent decades, organizations have faced various risks, including economic, environmental, technological, and geopolitical disturbances, culminating in unprecedented disruptions such as the COVID-19 pandemic. As a result, scientific interest in SCRM has expanded substantially, generating a fragmented and multidisciplinary body of knowledge. Bibliometric analysis provides a systematic approach to mapping the evolution, structure, and thematic orientation of this literature, enabling a comprehensive understanding of research trends, influential contributions, and emerging topics within the field. This study adopted a retrospective bibliometric research design to quantitatively analyze the scientific literature on supply chain risk management. Data were collected from three major academic databases - OpenAlex, Scopus, and Web of Science - selected for their broad coverage and compatibility with bibliometric tools. The review was initially conducted in November 2023 and updated in July 2025. Search queries were applied to the title and abstract fields using validated keywords related to SCRM, without restrictions on publication year or language. After data cleaning and deduplication, a final corpus of 6,277 unique documents was analyzed using the Bibliometrix package and its Biblioshiny interface. The results indicate a consolidated and steadily growing research field, with publications spanning from 1970 to 2025 and an annual growth rate of 4.1%, with a notable increase after 2020. The literature reveals moderate collaboration levels and limited international co-authorship, as well as a thematic shift from efficiency- and vulnerability-focused approaches toward resilience, digital transformation, and data-driven risk management strategies,

highlighting opportunities to strengthen international collaboration and integrate technological and sustainability perspectives.

**Keywords:** Supply Chain Risk Management; Bibliometric Review; Resilience; Digital Transformation; Scientific Mapping.

## **RESUMO**

A gestão de riscos da cadeia de suprimentos (SCRM) tem ganhado cada vez mais relevância devido à complexidade crescente, globalização e vulnerabilidade das cadeias de suprimentos a eventos disruptivos. Nas últimas décadas, as organizações enfrentaram diversos riscos, incluindo distúrbios econômicos, ambientais, tecnológicos e geopolíticos, culminando em interrupções sem precedentes, como a pandemia de COVID-19. Como resultado, o interesse científico pela SCRM expandiu-se substancialmente, gerando um corpo de conhecimento fragmentado e multidisciplinar. A análise bibliométrica oferece uma abordagem sistemática para mapear a evolução, estrutura e orientação temática desta literatura, permitindo uma compreensão abrangente das tendências de pesquisa, contribuições influentes e tópicos emergentes dentro da área. Este estudo adotou um desenho retrospectivo de pesquisa bibliométrica para analisar quantitativamente a literatura científica sobre gestão de riscos na cadeia de suprimentos. Os dados foram coletados de três grandes bancos de dados acadêmicos - OpenAlex, Scopus e Web of Science - selecionados por sua ampla cobertura e compatibilidade com ferramentas bibliométricas. A revisão foi realizada inicialmente em novembro de 2023 e atualizada em julho de 2025. Consultas de busca foram aplicadas aos campos de título e resumo usando palavras-chave validadas relacionadas ao SCRM, sem restrições de ano de publicação ou idioma. Após a limpeza e deduplicação de dados, um corpus final de 6.277 documentos únicos foi analisado

usando o pacote Bibliometrix e sua interface Biblioshiny. Os resultados indicam um campo de pesquisa consolidado e em constante crescimento, com publicações que vão de 1970 a 2025 e uma taxa anual de crescimento de 4,1%, com um aumento notável após 2020. A literatura revela níveis moderados de colaboração e coautoria internacional limitada, bem como uma mudança temática de abordagens focadas em eficiência e vulnerabilidade em direção à resiliência, transformação digital e estratégias de gestão de riscos baseadas em dados, destacando oportunidades para fortalecer a colaboração internacional e integrar perspectivas tecnológicas e de sustentabilidade.

**Palavras-chave:** Gestão de Riscos da Cadeia de Suprimentos; Revisão Bibliométrica; Resiliência; Transformação Digital; Mapeamento Científico.

## 1. INTRODUCTION

Global supply chains have become increasingly complex, interconnected, and exposed to a wide range of risks arising from economic volatility, geopolitical tensions, technological dependencies, environmental events, and public health crises (Christopher, M., & Peck, H., 2004), (Ivanov, D., & Dolgui, A., 2020). Disruptions such as natural disasters, financial crises, trade conflicts, and, most notably, the COVID-19 pandemic have revealed structural vulnerabilities in supply networks and highlighted the limitations of traditional efficiency-driven management approaches (Ivanov, D. 2021), (Tang, C. S., 2006). In this context, supply chain risk management (SCRM) has emerged as a critical research and managerial domain, focusing on the identification, assessment, and mitigation of risks that threaten supply chain continuity and performance (Jüttner, U. et al, 2003).

Over the past decades, the academic literature on SCRM has expanded substantially, encompassing diverse theoretical perspectives, methodological approaches, and application contexts (Colicchia, C., & Strozzi, F., 2012). This growth has resulted in a fragmented and multidisciplinary body of knowledge spanning operations management, logistics, engineering, information systems, sustainability, and strategic management (Ponomarov, S. Y., & Holcomb, M. C., 2009). While numerous conceptual frameworks and empirical studies have contributed to advancing the field, the rapid proliferation of publications makes it increasingly challenging to obtain a comprehensive and structured understanding of its intellectual foundations, thematic evolution, and emerging research trends (Tang, O., & Nurmayana, S., 2011).

Bibliometric analysis offers a systematic and quantitative approach to addressing this challenge by mapping the structure and dynamics of scientific production within a research field (Zupic, I., & Čater, T., 2015). By analyzing publication patterns, collaboration networks, thematic clusters, and citation structures, bibliometric methods enable the identification of influential contributions, dominant and emerging themes, and potential research gaps (Priem, J., Piwowar, H., & Orr, R., 2022). Accordingly, this study aims to provide a comprehensive bibliometric review of supply chain risk management research, offering insights into its temporal evolution, conceptual structure, and future research directions in an increasingly uncertain global environment.

## **2. METHODOLOGY**

This study adopted a bibliometric review as its first research stage, aiming to quantitatively map and analyze the scientific literature on

supply chain risk management (SCRM), following the methodological guidelines proposed by Aria and Cuccurullo (Aria, M., & Cuccurullo, C., 2017). The review was initially conducted in July 2025.

**Study Design:** Bibliometric retrospective study based on quantitative analysis of scientific publications retrieved from major academic databases.

**Study Location:** Data collection and analysis were conducted using the Bibliometrix R package and its Biblioshiny interface.

**Study Duration:** July 2025.

**Data Sources:** Three major bibliographic databases were selected due to their extensive coverage and compatibility with bibliometric tools:

- OpenAlex
- Scopus
- Web of Science (WoS)

These databases collectively ensured comprehensive retrieval of relevant scientific output.

**Search Strategy:** Search terms were defined based on exploratory reading and semantic validation. The final search string included:

"supply chain", "risk management", and "SCRM".

No filters regarding date, document type, or language were applied during initial collection.

### **Inclusion criteria:**

1. Articles explicitly addressing supply chain risk management.
2. Documents classified as “Research Article” or “Article”.
3. Publications containing search terms in the title or abstract.

### **Exclusion criteria:**

1. Conference papers, book chapters, editorials, and other non-article documents.
2. Duplicates across databases.
3. Records with incomplete metadata preventing import

### **Procedure methodology**

Data were collected from three major bibliographic databases - OpenAlex, Scopus, and Web of Science (WoS) - selected due to their broad multidisciplinary coverage, academic credibility, and compatibility with bibliometric analysis tools. The combined use of these databases enhances data completeness and reduces source-related bias, as recommended in prior bibliometric studies (Donthu, N. et al, 2021). The inclusion of OpenAlex further expanded the scope of the review by incorporating open-access records with greater flexibility in data export (Priem, J., Piwowar, H., & Orr, R., 2022).

The search strategy was designed to ensure transparency, reproducibility, and conceptual alignment with the research objectives. Search terms were defined based on an exploratory literature review and semantic validation, and queries were applied to the title and abstract fields using Boolean operators. No restrictions regarding publication year, language, or document type were applied during the initial retrieval phase in order to capture the historical evolution of the field. Subsequently, strict inclusion and exclusion criteria were applied to ensure the relevance and quality of the final corpus.

All retrieved records were exported in BibTeX format and imported into the Bibliometrix package using the Biblioshiny interface, following the methodological framework proposed by Aria and Cuccurullo (Aria, M., & Cuccurullo, C., 2017). The workflow included a structured sequence of data collection, filtering, preprocessing, and validation, ensuring traceability and replicability throughout the review process, in accordance with established bibliometric standards (Zupic, I., & Čater, T., 2015).

## **Statistical analysis**

After data import, a systematic deduplication process was conducted to eliminate redundant records indexed across multiple databases, resulting in a final corpus of 6,277 unique documents. Descriptive bibliometric analyses were then performed to identify temporal trends, publication patterns, collaboration structures, and thematic distributions within the SCRM literature.

Additionally, metadata completeness was assessed to identify potential analytical limitations. While core fields such as publication

year, document type, and title presented full completeness, other fields - such as keywords, abstracts, author affiliations, and cited references - exhibited varying levels of missing data. These limitations were explicitly considered during interpretation, with analytical emphasis placed on robust indicators less sensitive to metadata gaps.

### 3. RESULT

The bibliometric analysis reveals a consolidated and steadily growing body of scientific literature on supply chain risk management (SCRM). The dataset spans from 1970 to 2025 and comprises 6,277 documents published across 2,496 sources, indicating a broad and multidisciplinary research field. The annual growth rate of 4.1% suggests moderate but consistent expansion, with a pronounced acceleration in publication volume over the last two decades. The average document age of 6.7 years reflects the contemporaneity of the literature, while the mean of 16.12 citations per document indicates a moderate level of scientific impact. Table 1 presents an overview of the main descriptive statistics of the articles included in the bibliometric analysis.

**Table 1:** Overview of the Article Dataset.

Main Information About the Data	
Description	Results
Time span	1970–2025
Sources (Journals, Books, etc.)	2,496
Documents	6,277

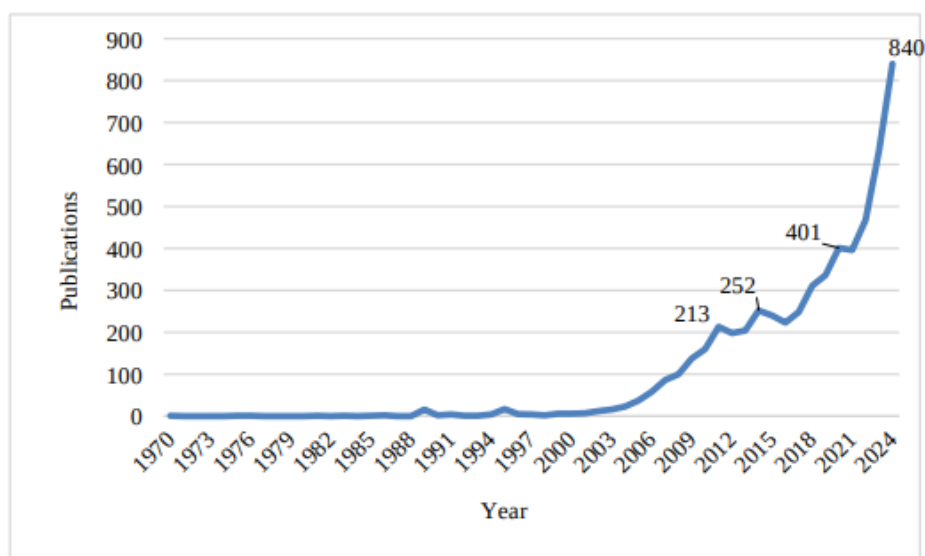
Annual growth rate (%)	4.1
Average document age	6.7 years
Average citations per document	16.12
References	0
<b>Document Content</b>	
<b>Description</b>	<b>Results</b>
Keywords Plus (ID)	6,638
Author keywords (DE)	7,113
<b>Authors</b>	
<b>Description</b>	<b>Results</b>
Authors	13,310
Authors of single-authored documents	1,352
<b>Author Collaboration</b>	
<b>Description</b>	<b>Results</b>
Single-authored documents	1,533
Co-authors per document	2.82
International co-authorship (%)	5.74%

The analysis highlights an active research community, with 13,310 contributing authors. Despite this, collaboration patterns remain relatively modest: the average number of co-authors per document is 2.82, and single-authored publications account for 1,533 documents. International collaboration is limited, representing only 5.74% of co-authored papers, which may reflect geographic concentration, linguistic barriers, or structurally localized research

networks. These findings suggest that, although the field is collaborative, it has not yet achieved a high degree of global integration.

Temporal analysis of annual publications demonstrates a clear evolutionary trajectory. Between 1970 and the mid-1990s, scientific output was minimal, indicating an embryonic stage of the field. From the late 1990s onward, publication activity increased gradually and intensified substantially after 2006, marking the consolidation of SCRM as a distinct research domain. The most significant growth occurred after 2020, culminating in a peak of 840 publications in 2024. This surge reflects the heightened academic attention driven by global disruptions, particularly the COVID-19 pandemic, directly addressing the first two research questions of the bibliometric review. Figure 1 illustrates the annual evolution of publications on supply chain risk management over the analyzed period.

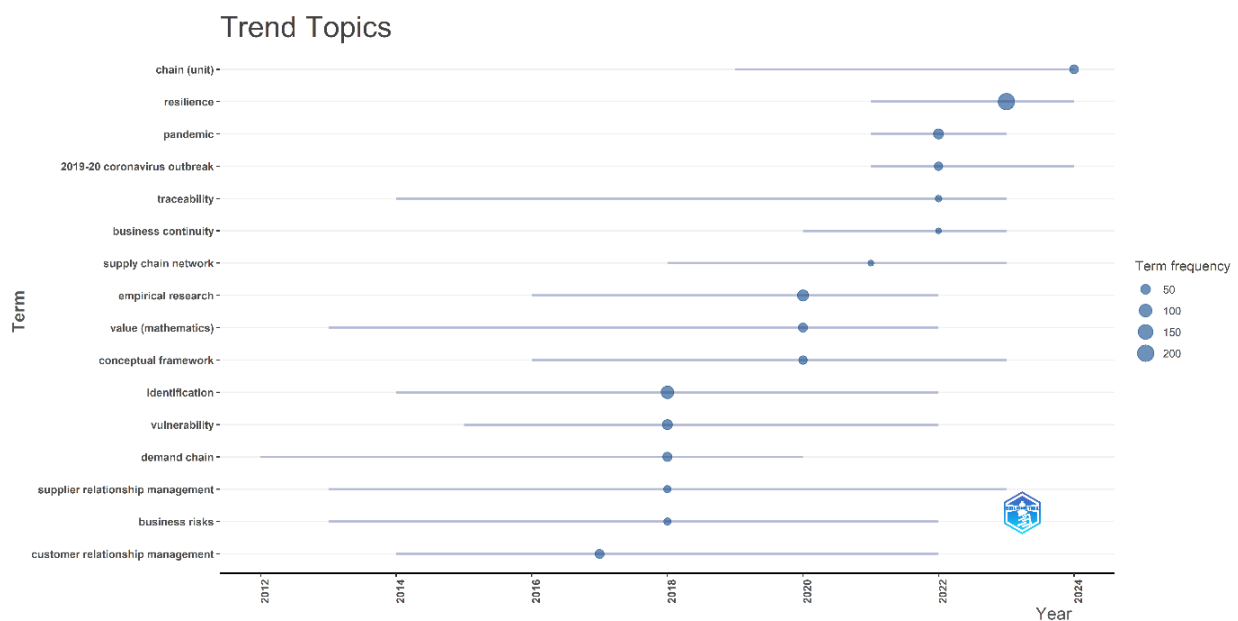
**Figure 1:** Publications per year.



Thematic trend analysis based on author keywords reveals a clear shift in research priorities over time. Between 2016 and 2018, dominant topics were associated with traditional supply chain management concerns, such as vulnerability identification, demand

management, customer relationships, and conceptual modeling. From 2020 onward, a paradigmatic transition is observed, with the emergence of crisis-related and resilience-oriented themes. Keywords such as pandemic, COVID-19, resilience, and traceability became increasingly prominent, indicating a direct scholarly response to the systemic shocks experienced by global supply chains. Figure 2 presents the trending research topics based on author-assigned keywords over the analyzed period.

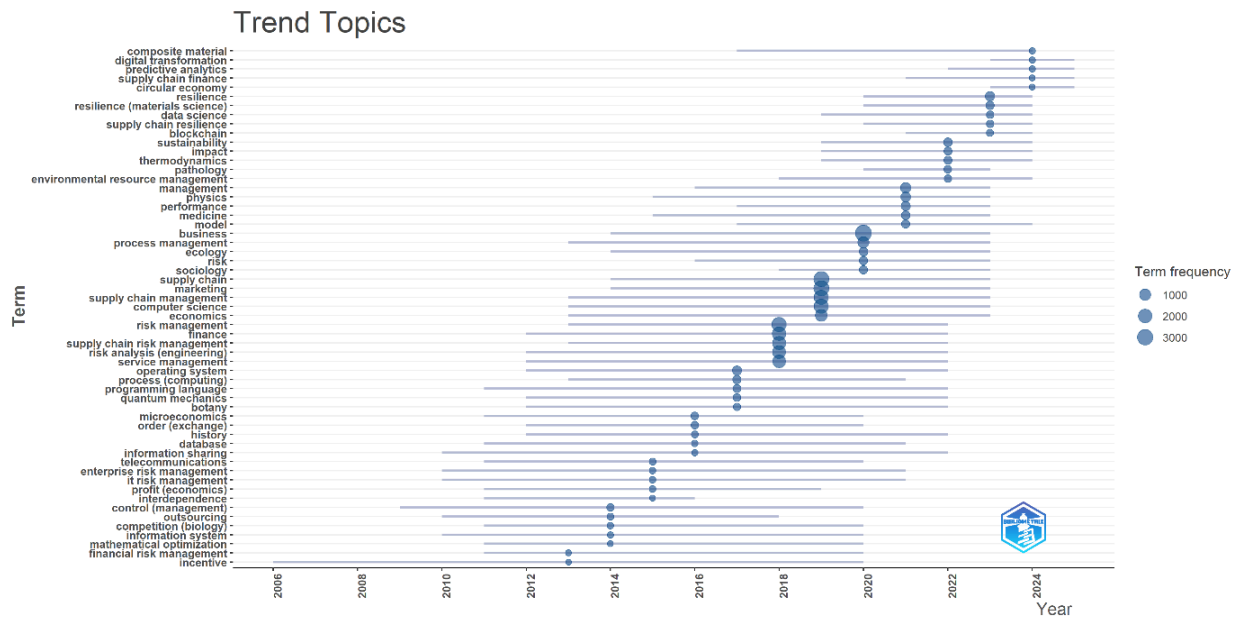
**Figure 2:** Trending topics – author keywords.



Recalculation of trending topics using the complete set of keywords confirms and extends these findings. Recent years show a strong rise in digitally oriented themes, including digital transformation, blockchain, and data science, reflecting the growing role of advanced technologies in mitigating risk, enhancing transparency, and improving decision-making under uncertainty. Simultaneously, supply chain resilience emerges as a central and expanding concept, suggesting a shift from reactive risk management approaches toward long-term strategies focused on adaptability and robustness.

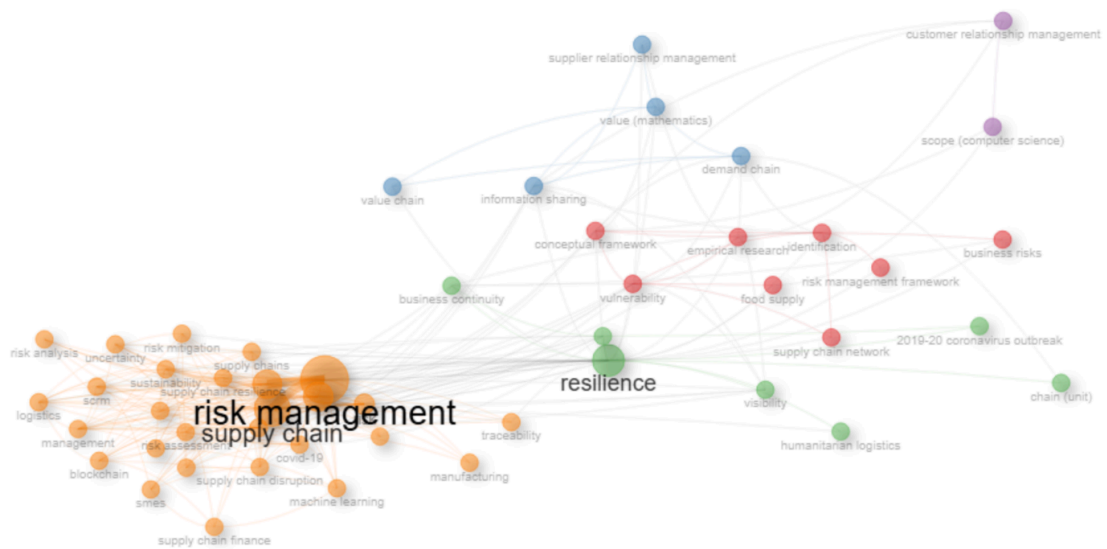
Figure 3 depicts the trending research topics based on the complete set of keywords over the analyzed period.

**Figure 3:** Trending topics – all keywords.



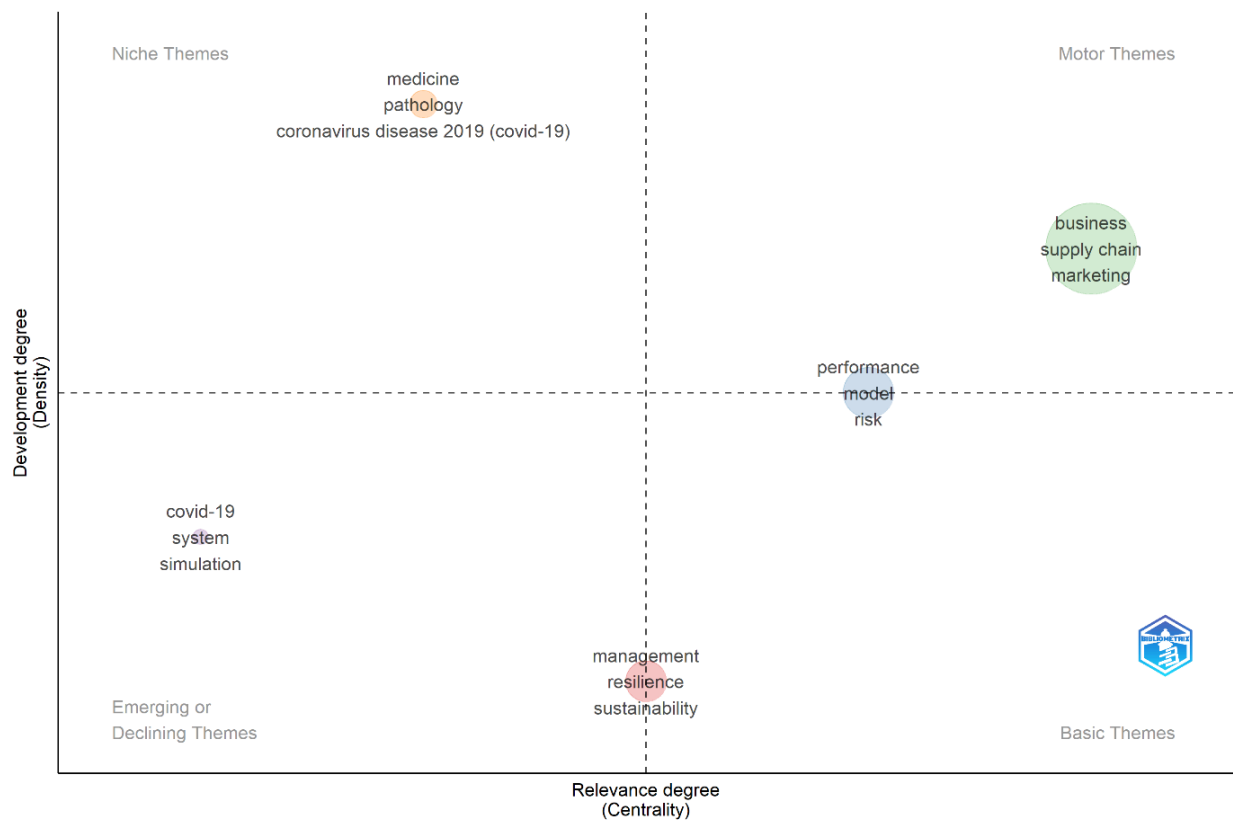
The keyword co-occurrence network reveals a dense and interconnected thematic structure, with supply chain and risk management occupying central positions within the network. The term resilience, while less central, functions as a key bridging concept linking technological, operational, and strategic research streams. Cluster analysis identifies distinct thematic groups, including operational risk and technological innovation, resilience and business continuity, theoretical risk frameworks, strategic relationships within value chains, and customer-oriented and computational applications. This structure highlights the increasing integration of technology and risk management in contemporary research. Figure 4 illustrates the co-occurrence network of author keywords, highlighting the main thematic relationships within the analyzed literature.

**Figure 4:** Co-occurrence network of author keywords.



The thematic map further clarifies the intellectual structure of the field. Motor themes are concentrated around business, supply chain, and marketing, indicating well-developed and influential research areas. Basic themes, such as performance and management, show high relevance but lower development density, suggesting opportunities for further conceptual and empirical refinement. Niche themes, including medically oriented clusters, demonstrate high internal development but limited centrality. Resilience occupies an intermediate position between basic and niche themes, confirming its role as an emerging and transversal research axis with significant potential for future advancement. Figure 5 presents the thematic map, illustrating the distribution of research themes based on their centrality and density within the analyzed literature.

**Figure 5:** Thematic map.



Citation analysis identifies a set of foundational and highly influential works that structure the field. Seminal contributions by Christopher (2006), Sheffi and Rice (2005), Kleindorfer and Saad (2005), and Ponomarov and Holcomb (2009) form the classical theoretical core of SCRM and supply chain resilience research. More recent highly cited studies, particularly those by Ivanov (2021), highlight the growing relevance of digitalization, Industry 4.0, and simulation-based approaches in managing disruption risks. The coexistence of conceptual, empirical, and case-based studies underscores the multidimensional and interdisciplinary evolution of the field. Table 2 lists the most cited articles in the supply chain risk management literature, highlighting the most influential contributions in the field.

**Table 2:** Most cited articles.

Autor(es)	Ano	Título	Total Citations
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Christopher & Peck	2006	<i>Perspectives in Supply Chain Risk Management</i>	2346
Sheffi & Rice	2005	<i>A Supply Chain View of the Resilient Enterprise</i>	1508
Ponomarov & Holcomb	2009	<i>Understanding the Concept of Supply Chain Resilience</i>	1279
Kleindorfer & Saad	2005	<i>Managing Disruption Risks in Supply Chains</i>	1266
Jüttner, Peck & Christopher	2003	<i>Supply Chain Risk Management: Outlining an Agenda for Future Research</i>	1167
Ambulkar, Blackhurst, & Grawe	2015	<i>Firm's Resilience to Supply Chain Disruptions: Scale Development and Empirical Examination</i>	824
Brandon-Jones et al.	2014	<i>A Contingent Resource-Based Perspective of Supply Chain Resilience and Robustness</i>	820
Norrman & Jansson	2004	<i>Ericsson's Proactive Supply Chain Risk Management Approach After a Serious Sub-supplier Accident</i>	799
Braunscheidel & Suresh	2009	<i>The Organizational Antecedents of a Firm's Supply Chain Agility for Risk Mitigation and Response</i>	785
Ivanov	2021	<i>A Digital Supply Chain Twin for Managing the Disruption Risks and Resilience in the Era of Industry 4.0</i>	760
James	2011	<i>An Overview of Recovery Models and Algorithms for</i>	741

		<i>Real-time Railway Rescheduling</i>	
Jüttner	2005	<i>Supply Chain Risk Management: Understanding the Business Requirements from a Practitioner Perspective</i>	733
Jüttner	2011	<i>Supply Chain Resilience in the Global Financial Crisis: An Empirical Study</i>	717
George	2018	<i>Supply Chain Risk Management and Artificial Intelligence: State of the Art and Future Research Directions</i>	710
Claudia et al.	2012	<i>Supply Chain Risk Management: A New Methodology for a Systematic Literature Review</i>	678
Manuj & Mentzer	2008	<i>Global Supply Chain Risk Management Strategies</i>	659
Mihalís	2015	<i>Supply Chain Sustainability: A Risk Management Approach</i>	648
Tang	2011	<i>Identifying Risk Issues and Research Advancements in Supply Chain Risk Management</i>	571
Ivanov, D.	2017	<i>Literature Review on Disruption Recovery in the Supply Chain</i>	548

Finally, the analysis of publication sources indicates a concentration of research in journals specialized in production, logistics,

sustainability, and operations management. Figure 6 shows the main publication sources by number of articles, highlighting the journals that concentrate the largest share of scientific output in the field.

**Figure 6:** Main publication sources.



Leading outlets such as SSRN Electronic Journal, International Journal of Production Research, and Sustainability play a central role in disseminating SCRM research. The presence of engineering- and technology-oriented journals further reinforces the increasing convergence between supply chain risk management, digital technologies, and sustainability, positioning SCRM as a strategically relevant and evolving research domain.

## 4. DISCUSSION

The bibliometric results demonstrate that supply chain risk management has evolved into a consolidated and strategically relevant research field, with sustained growth in scientific output and a marked acceleration after 2020 (Ho, W. et al, 2015). This expansion reflects the increasing exposure of global supply chains to systemic disruptions and confirms the catalytic role of major crises—particularly the COVID-19 pandemic—in reshaping research agendas (Ivanov, D., & Dolgui, A., 2020). Despite the size and maturity of the literature, collaboration patterns remain relatively limited, as evidenced by modest co-authorship levels and low international collaboration, a phenomenon also noted in other bibliometric assessments of management and operations research (Donthu, N. et al, 2021). This suggests a structural fragmentation that contrasts with the inherently global nature of supply chain risks, highlighting the need for broader cross-country and interdisciplinary research networks (Jüttner, U. et al, 2003).

The thematic evolution of the field indicates a clear paradigmatic shift from efficiency- and prevention-oriented approaches toward resilience, adaptability, and continuity (Christopher, M., & Peck, H., 2004). The growing prominence of resilience and digital transformation-related themes underscores the integration of technological and data-driven solutions into risk management strategies (Sheffi, Y. et al, 2005). While core concepts related to supply chain and risk management remain central (Tang, C. S., 2006) resilience emerges as a transversal yet not fully consolidated construct, suggesting opportunities for deeper theoretical refinement and empirical validation (Fan, Y., & Stevenson, M., 2018). Overall, the findings indicate that SCRM research is transitioning

toward a holistic and systems-oriented perspective, in which resilience, digitalization, and sustainability are increasingly interconnected dimensions (Gölgeci, I. et al, 2020).

## 5. CONCLUSION

This study provides a comprehensive bibliometric overview of supply chain risk management research, revealing a field that has matured significantly while continuing to expand in response to increasing global uncertainty. The results highlight a clear shift toward resilience-oriented and digitally enabled approaches, reflecting the growing need for adaptive and robust supply chain systems. Despite the consolidation of foundational theories, opportunities remain for advancing international collaboration, refining resilience constructs, and integrating technological and sustainability perspectives. By mapping the intellectual structure and thematic evolution of the literature, this study offers a structured foundation for future research and supports the development of more resilient and data-driven supply chain strategies.

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