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Bibliometric Analysis of Supply Chain Analytics: Trends, Research Impact, and Evolution (2001–2025)

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Abstract

This research presents a comprehensive bibliometric evaluation of the scholarly work on supply chain analytics from 2001 to 2025. The study utilises tools such as VOSviewer and R Programming to map the intellectual landscape, identify trends, and assess the research impact and evolution within the field of supply chain analytics. The analysis is based on a systematic review of 1,405 publications indexed in the Scopus databases. Using VOSviewer, the study visualises citation and keyword co-occurrence networks to uncover thematic clusters, while R Programming is employed for statistical analysis and trend identification. The findings indicate significant growth in supply chain analytics research, driven by advancements in big data as well as artificial intelligence (AI) and machine learning (ML), which have transformed decision-making processes in supply chains. Key themes identified include predictive analytics, sustainability, risk management, and digital supply chain integration. Emerging trends point to a shift towards real-time analytics, IoT-driven decision-making, and AI-powered supply chain optimisation. Furthermore, the study identifies influential authors and highlights the global distribution of research contributions. The analysis reveals an evolution in research focus, shifting from traditional optimisation models to more data-centric, real-time analytics. This research offers valuable insights for academics, practitioners, and policymakers by identifying research gaps and suggesting future directions in supply chain analytics. It provides a roadmap for future research and emphasises the interdisciplinary nature of the field. By synthesising 25 years of research, this work illuminates the development of supply chain analytics and its significance for supply chain management in the era of Industry 4.0 and beyond.

Keywords: Bibliometric Analysis, Industry 4.0, R Programming, VOSviewer, Supply Chain Analytics

Abbreviations: SCA Supply Chain Analytics, AI Artificial intelligence, ML Machine Learning, IoT Internet of Things, I4.0 Industry 4.0, CSV Comma Separated Values

Introduction

Over the past two decades, supply chain analytics (SCA) has witnessed transformative growth, driven by the advent of big data, artificial intelligence (AI), and Industry 4.0 technologies. SCA broadly defined as the application of data analysis tools and techniques to improve decision-making in supply chain management, and has emerged as a critical enabler of efficiency, agility, and competitiveness across industries (Waller & Fawcett, 2013). The increasing complexity of global supply chains, coupled with the exponential growth of data, has amplified the need for advanced analytics capabilities to support real-time, data-centric decision-making (Choi, Wallace & Wang, 2018). SCA integrates methodologies from operations research, statistics, data science, and computer science to address various supply chain challenges, including demand forecasting, inventory optimisation, risk management, and sustainability (Syntetos et al., 2016). The rise of digital technologies, including the Internet of Things (IoT), cloud computing, and blockchain has further accelerated the adoption of analytics in supply chains, enabling end-to-end visibility and responsiveness (Ivanov et al., 2019).

The research landscape of SCA has expanded significantly, attracting attention from scholars across multiple disciplines and regions. Given this rapid growth and interdisciplinary nature, a systematic and comprehensive review of the intellectual structure and evolution of the SCA field is both timely and essential. Bibliometric analysis serves as a robust and objective method to map the development of scholarly domains by examining publication patterns, co-authorship networks, citation structures, and keyword trends (Donthu et al., 2021). This study applies a bibliometric analysis to investigate the scientific output on SCA from 2001 to 2025, aiming to uncover key research themes, influential contributors, and emerging trends. Tools such as VOSviewer, and R Programming have become integral in bibliometric research for their capabilities in visualising and analysing large datasets. VOSviewer allows for the construction of network maps representing co-authorship, co-citation, and keyword co-occurrence, thus revealing collaborative patterns and thematic clusters (Van Eck & Waltman, 2010). R Programming facilitates advanced statistical analysis and data visualisation, enabling the identification of publication and citation trends over time.

The present study aims to fill the gap in the literature by synthesising over two decades of research in SCA. It highlights how the focus has shifted from traditional optimisation models to data-driven, intelligent, and integrated approaches. The findings offer insights into key areas of scholarly attention, such as sustainability, predictive analytics, and digital transformation, while identifying underexplored topics that present opportunities for future research. This study contributes to the strategic planning of academics, practitioners, and policymakers. It offers a roadmap for future investigations and reinforces the role of analytics as a cornerstone of modern supply chain management in Industry 4.0 and beyond.

Review of Literature

The evolution of SCA has been shaped by a growing emphasis on data-centric decision-making and technological advancements. As global supply chains have become increasingly complex, the application of analytics has transformed from traditional optimisation techniques to integrated models incorporating big data, AI, and ML (Waller & Fawcett, 2013). This transition has motivated a surge in academic research exploring the potential of analytics tools to improve visibility, responsiveness, and resilience across supply chain operations. Early literature on SCA focused on the application of descriptive and prescriptive analytics in forecasting, inventory control, and logistics optimisation (Chae, 2009). Over the period, scholars have acknowledged the increasing role of predictive analytics in anticipating market trends, demand fluctuations, and disruption risks (Syntetos et al., 2016). The emergence of big data analytics marked a significant shift, enabling real-time data capture and analysis across multiple supply chain touchpoints (Choi, Wallace & Wang, 2018). Studies by Wang et al. (2016) and Wamba et al. (2017) highlighted how big data analytics capabilities influence operational performance, competitive advantage, and strategic alignment in supply chains. The literature has also examined the influence of Industry 4.0 technologies on supply chain transformation. Ivanov et al. (2019) introduced the concept of the digital supply chain twin, integrating real-time data, simulation, and analytics for proactive decision-making. IoT, cloud computing, and blockchain have further enhanced the depth and speed of analytics integration. These digital enablers not only improve operational efficiency but also support sustainability goals, an emerging theme in SCA research (Bag et al., 2021).

Recent reviews and bibliometric analyses have mapped the intellectual structure and thematic progression in SCA. Ghadge et al. (2020) performed a systematic review and found a growing focus on supply chain risk analytics and resilience strategies. However, these reviews often lack a comprehensive bibliometric perspective that combines network visualisation and temporal evolution. The use of bibliometric methods in supply chain research has gained momentum as scholars seek to understand the trajectory and influence of research themes, authors, and institutions. Donthu et al. (2021) emphasised that the bibliometric tool VOSviewer enables mapping of co-authorship, keyword clustering, and citation bursts, providing quantitative insights into scholarly trends and collaborations. Aria and Cuccurullo (2017) introduced the Bibliometrix R-package, which facilitates advanced bibliometric and content analysis. Despite these advances, there remains a gap in studies that comprehensively span the timeline from 2001 to 2025, integrating emerging trends such as AI-powered supply chain optimisation, real-time analytics, and data democratisation. A bibliometric analysis across this time frame offers the opportunity to trace paradigm shifts, identify research frontiers, and highlight interdisciplinary convergence in SCA. The evolving landscape of supply chain management has witnessed a transformative shift with the integration of advanced SCA. Over the past two decades, researchers have increasingly explored how analytics spanning descriptive, predictive, and prescriptive forms enhance decision-making, resilience, and sustainability within global supply chains. Recent studies have highlighted the strategic role of analytics in driving environmental and operational performance. Bag and Rahman (2024) emphasised how top supply chain executives leverage political and analytical capabilities to promote circular economy practices and ensure supply chain viability. Brau et al. (2024) indicate that AI and people analytics significantly support decision-making in retail supply chains, improving responsiveness and efficiency.

The role of AI-powered SCA was further emphasised by Dubey et al. (2021), who illustrated how alliance management during crises, such as the COVID-19 pandemic, facilitates the successful adoption of advanced analytics in B2B contexts. Smyth et al. (2024) provided a systematic review suggesting that prescriptive analytics, supported by AI, is crucial for enhancing supply chain resilience amid uncertainties. Big data analytics (BDA) also emerges as a central capability in building resilience. Jiang et al. (2024) argued that integration between BDA and supply chain functions enables firms to withstand disruptions more effectively. Kayvanfar et al. (2024) reviewed decision support systems (DSS) using IoT and web mining, showcasing their growing relevance in real-time analytics and logistics. Earlier foundational works by Zhu et al. (2018) and Srinivasan and Swink (2018) established the theoretical grounding for SCA's role in improving visibility, flexibility, and transparency. Tiwari et al. (2024) advocated for a digitally enabled supply chain ecosystem, underscoring the strategic integration of analytics in modern supply chain management.

Research Methodology

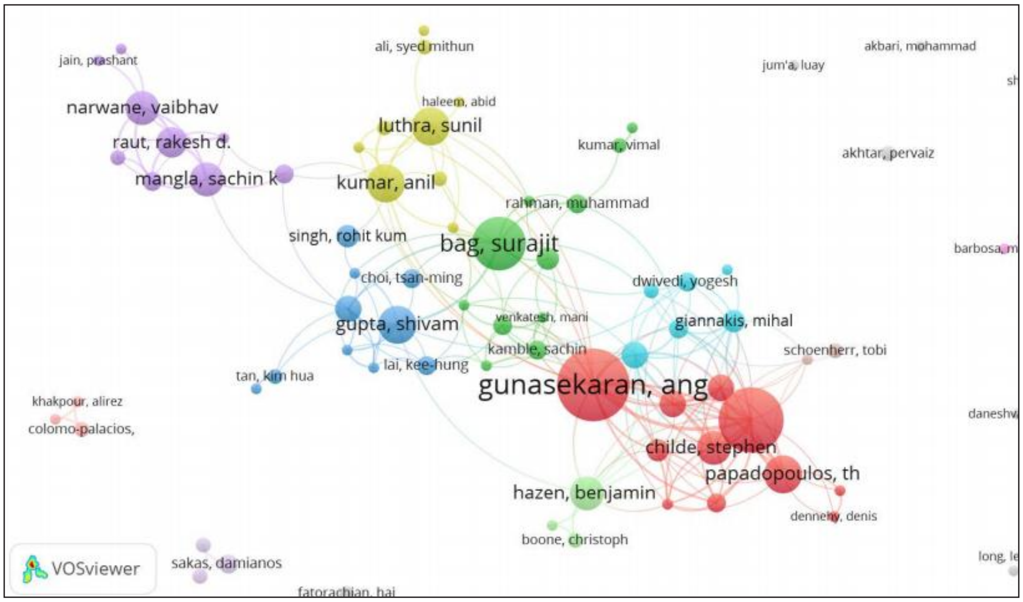
This study adopts a quantitative bibliometric methodology to examine the evolution, intellectual structure, and research impact of SCA from 2001 to 2025. Bibliometric analysis enables the systematic evaluation of a large body of literature by quantifying patterns such as publication trends, co-authorship, keyword co-occurrence, citation structures, and institutional collaboration. This approach is particularly suited to synthesising scholarly output over time and identifying emerging research frontiers (Donthu et al., 2021). The primary data source for this study is the Scopus database, recognised for its broad and high-quality indexing of peer-reviewed literature. Using a refined search strategy, relevant documents were retrieved by querying titles, abstracts, and keywords with terms such as "supply chain analytics," "supply chain big data," "predictive analytics," "machine learning in supply chain," and related expressions. The search was limited to the time frame 2001 to 2025, including early access and forthcoming publications up to 2025. The final dataset, exported in CSV format, included essential bibliographic information such as author names, affiliations, source titles, publication years, keywords, abstracts, and citations.

Following the export, the data were refined by removing duplicates, non-English records, and irrelevant entries. A total of 1,405 documents formed the corpus for analysis. The CSV file was pre-processed and formatted for compatibility with bibliometric tools. Two leading bibliometric and visualisation tools were used in this study: VOSviewer and the Bibliometrix package in R. VOSviewer was used to generate visual network maps for keyword co-occurrence analysis. The software facilitates clustering and density visualisation, allowing the identification of thematic areas and intellectual structures within SCA research (Van Eck & Waltman, 2010). Maps were interpreted based on link strength, total link strength, and cluster density. R Programming, particularly the Bibliometrix and Biblioshiny packages (Aria & Cuccurullo, 2017), enabled advanced statistical analysis. Bibliometrix supported trend analysis, most relevant authors, and conceptual structure mapping. Biblioshiny provided an intuitive GUI to validate the output and further refine parameters.

The methodology followed a dual approach: performance analysis assessed productivity and impact by measuring publication counts, citations, and author/journal prominence. Science Mapping focused on visualising the structure of the research field through network maps, including collaboration networks (author/institution/country), keyword co-occurrence, and co-citation patterns. All data used were sourced from Scopus bibliographic metadata. No full-text content or confidential information was used. Limitations include potential exclusion of relevant articles not indexed in Scopus and inconsistencies in author name disambiguation, which were mitigated using manual cross-verification where necessary.

Result and Discussion

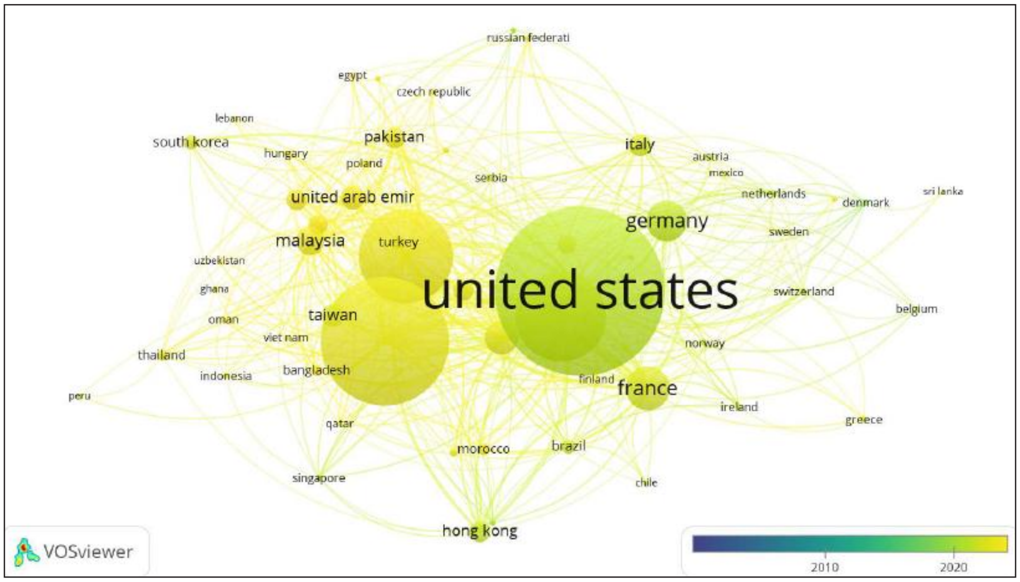
The VOSviewer-generated bibliometric network map and author impact in Fig. 1 provide insights into the intellectual structure of SCA research between 2001 and 2025.



Author	Documents	Citations	Total Link Strength
Gunasekaran, Angappa	19	6390	71
Dubey, Rameshwar	17	5356	69
Bag, Surajit	14	1689	22
Ivanov, Dmitry	14	2988	5
Shokouhyar, Sajjad	13	367	9
Papadopoulos, Thanos	10	2524	26
Gupta, Shivam	10	1191	24
Kumar, Anil	10	1018	20
Luthra, Sunil	10	662	16

Fig. 1: Co-Authorship Visualisation (VOSviewer)

The co-authorship visualisation highlights distinct clusters of influential researchers, indicating collaborative networks and thematic affinities. Gunasekaran, Angappa emerges as the most central and influential author, with 19 documents, 6,390 citations, and a total link strength of 71, signifying extensive collaboration and citation impact. Closely following are Dubey, Rameshwar and Bag, Surajit, both of whom demonstrate substantial publication volume and interconnectivity within their respective research communities. Their positioning within colour-coded clusters reflects interdisciplinary engagements, such as operations management, data analytics, and sustainability. Authors such as Giannakis, Mihalis, and Papadopoulos, Thanos are situated at the intersection of several clusters, indicating bridging roles across thematic boundaries. The colour-coded clusters represent distinct research themes, such as green for sustainability-focused analytics, red for digital transformation and AI integration, and yellow for risk management and resilience. The visual proximity and link thickness between authors indicate frequent co-authorships and mutual citations, reflecting cohesive research communities. This bibliometric visualisation underscores the evolution of collaborative structures and the emergence of thought leaders shaping the field of SCA.



Country	Documents	Citations	Total Link Strength
United States	348	21808	283
India	265	9192	234
China	195	9083	189
United Kingdom	185	17155	291
France	92	14985	169

Fig. 2: Country-Wise Bibliometric Analysis (VOSviewer)

The colour gradient signifies the temporal evolution of contributions, with earlier contributions shaded blue and more recent activity indicated in green and yellow hues. Overall, this analysis underscores the dominance of Western countries while also reflecting the growing scholarly influence of Asian economies in advancing the field of SCA (Fig. 2).

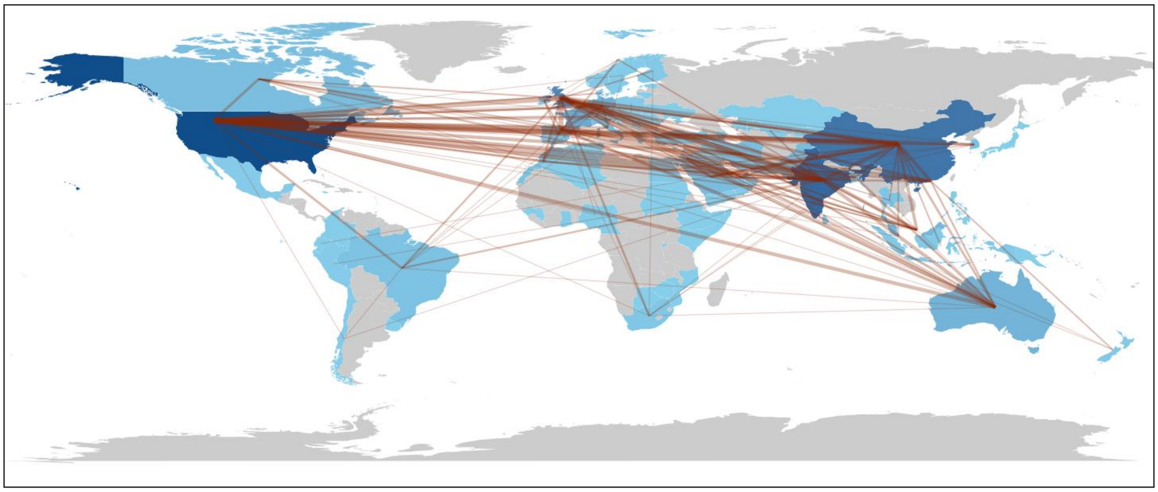


Fig. 3: Countries' Collaborations (Biblioshiny)

In Fig. 3, The VOSviewer world map illustrates the international collaboration network in SCA research from 2001 to 2025. Darker blue shades represent higher publication output, with the United States, India, China, and the United Kingdom leading in global research contributions. The red connecting lines indicate strong collaborative ties among countries, particularly between the U.S. and Europe, and between Asia and Western nations. This dense intercontinental collaboration highlights the globalised nature of SCA, driven by shared technological advancements and cross-border challenges. The map underscores the growing importance of international partnerships in shaping impactful and multidisciplinary research in this field.

In Fig. 4, the co-occurrence network analysis using VOSviewer provides a comprehensive visualisation of the intellectual structure of SCA by mapping keyword associations from 2001 to 2025. The network identifies six major clusters, each representing a thematic research area. The central theme revolves around "data analytics," serving as the core node linking various subtopics. The red cluster emphasises strategic components such as supply chain innovation, resilience, agility, and big data analytics. The yellow cluster revolves around predictive analytics, DSS, and risk management, emphasising data-centric decision-making processes. The green cluster is centred on sustainability, environmental impact, and digital transformation, reflecting the field's evolution towards eco-conscious analytics.

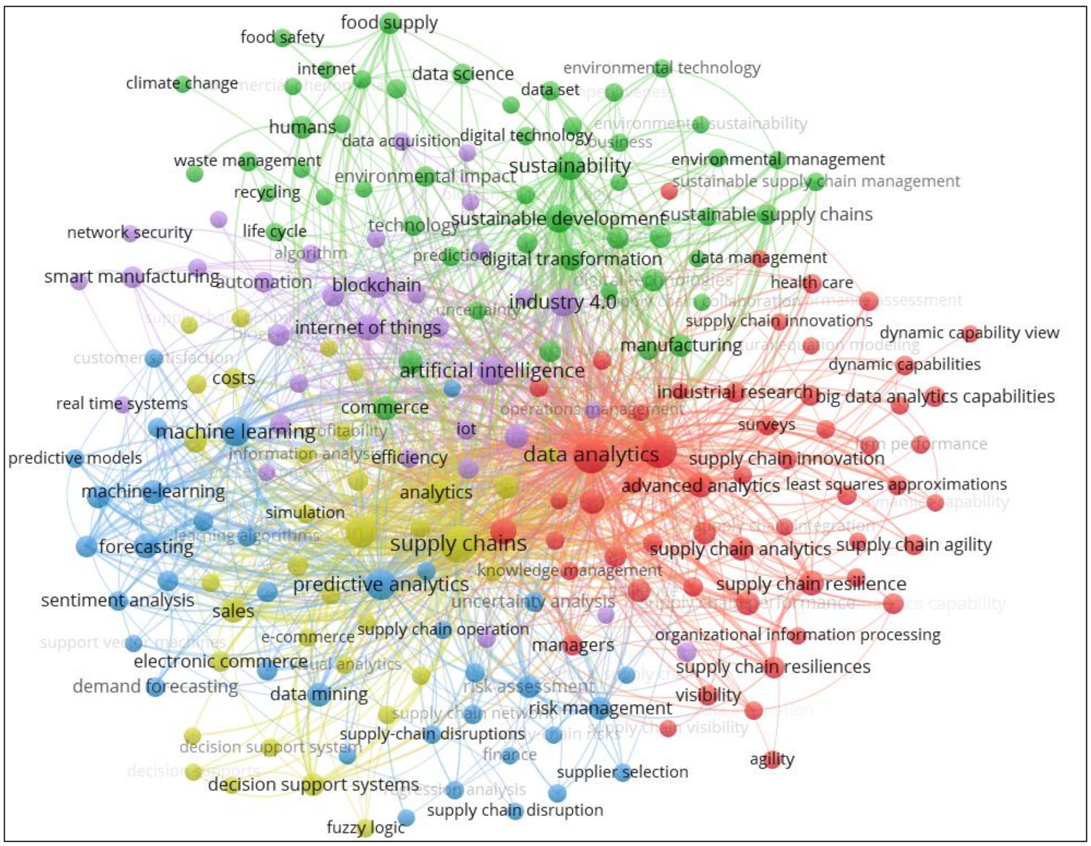


Fig. 4: Co-Occurrence Network Analysis (VOSviewer)

The blue cluster highlights predictive modelling, machine learning, and sentiment analysis, underscoring the role of AI and forecasting techniques. The purple and violet clusters focus on emerging technologies such as IoT, automation, blockchain, and smart manufacturing. This multidimensional mapping reveals how SCA has evolved from traditional data mining to an interdisciplinary domain integrating AI, sustainability, and digital technologies. The proximity and thickness of lines indicate the strength of relationships, confirming that the research community increasingly engages with holistic and real-time analytics solutions in response to dynamic market demands and Industry 4.0.

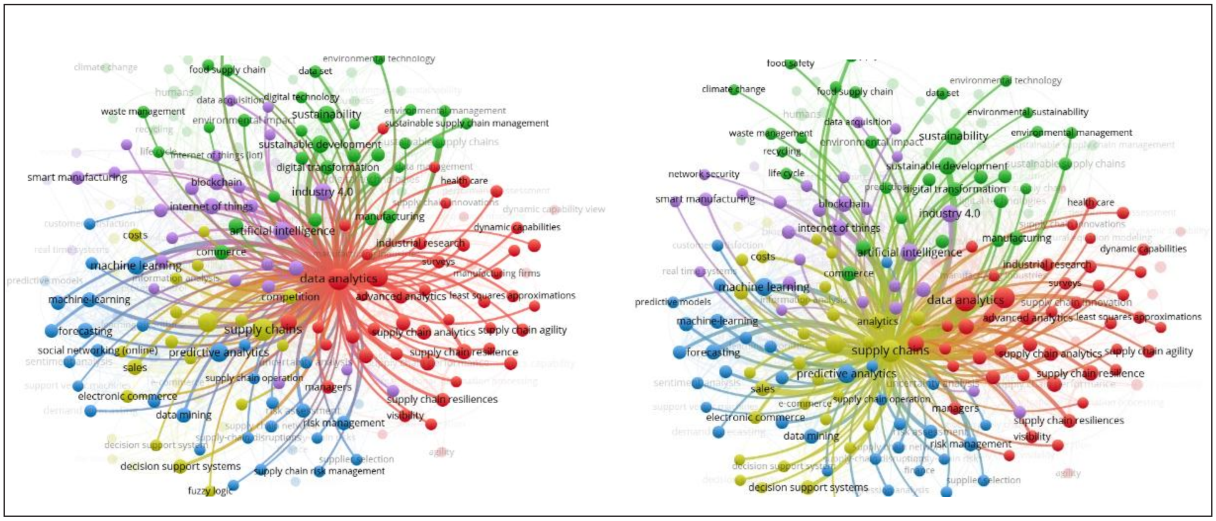
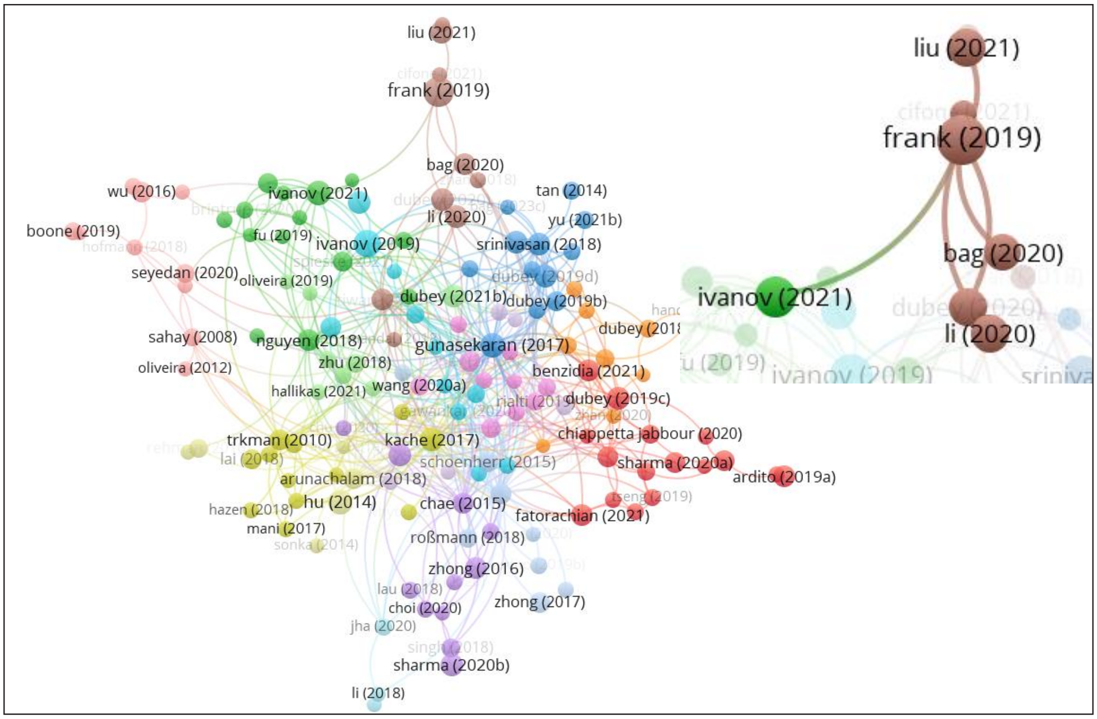


Fig. 5: Co-Occurrence Network Analysis Clusters (VOSviewer)

In Fig. 5, the red cluster represents a strategic and managerial focus in SCA, with core keywords such as "supply chain innovation" "resilience", "agility" and "advanced analytics". This cluster reflects the shift towards dynamic capability building within organisations, emphasising responsiveness and robustness in uncertain environments. Research in this area integrates BDA with decision-making frameworks to enhance supply chain performance and agility. It suggests that modern supply chain strategy is increasingly reliant on data-driven insights to manage disruptions, improve visibility, and build competitive advantage, particularly under the frameworks of digital transformation and Industry 4.0.

The yellow cluster focuses on data-driven operational decision-making, anchored by keywords such as "predictive analytics," "supply chains," "decision support systems," and "risk assessment." This cluster reflects the integration of analytical tools such as data mining, fuzzy logic, forecasting, and electronic commerce in optimising supply chain operations. The emphasis is on enhancing efficiency, demand forecasting, and risk management. This body of literature highlights how predictive technologies are embedded into routine supply chain functions to improve real-time responsiveness and reduce uncertainty. The yellow cluster is thus central to the operationalisation of analytics for improving tactical and strategic decisions.

Fig. 6, the bibliometric analysis using VOSviewer highlights the intellectual structure of influential authors contributing to the domain of SCA and digital technologies. The visualisation reveals tightly knit clusters of co-cited authors, indicating thematic collaborations. Frank (2019) emerges as the most cited document with 2001 citations, underscoring its pivotal contribution to the literature. Ivanov appears twice Ivanov (2019) with 1,228 citations and Ivanov (2021) with 770 citations, reflecting sustained influence over multiple years. Other prominent works include Waller (2013a) and Hu (2014), indicating early foundational contributions that continue to be referenced. The proximity of nodes such as Gunasekaran (2017), Kache (2017), and Hazen (2014) within the network suggests a shared focus on digital supply chains, risk management, and organisational capabilities. Authors such as Chen (2015) and Srinivasan (2018) are also well-cited, pointing to their role in theoretical development and practical applications.



Document	Citations
Frank (2019)	2001
Ivanov (2019)	1228
Waller (2013a)	1021
Hu (2014)	870
Gunasekaran (2017)	843
Ivanov (2021)	770
Hazen (2014)	677
Chen (2015)	639
Kache (2017)	632
Li (2020)	605
Srinivasan (2018)	597

Fig. 6: Top Authors: The Bibliometric Analysis (VOSviewer)

The clustering of authors by colour indicates distinct research streams: digital transformation, resilience, predictive analytics, and sustainability. Interconnected links reflect collaborative citations, evidencing intellectual synergy among research groups. Overall, the visualisation shows an evolving and interdisciplinary scholarly network, led by a few highly influential researchers whose work anchors ongoing advancements in supply chain and digital analytics literature.

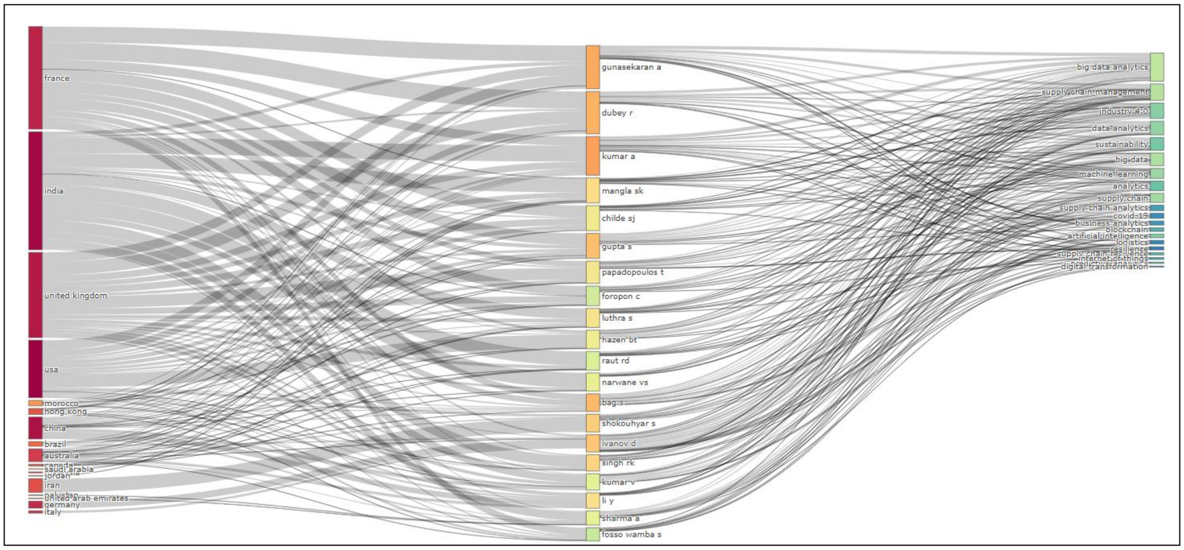


Fig. 7: Thematic Evolution Sankey Diagram

The attached image, Fig. 7, presents a thematic evolution Sankey diagram comprising three dimensions: country, author, and keywords/topics. This visualisation is commonly used in bibliometric analysis to explore the evolution and interconnection of research themes across geographic and scholarly dimensions. The leftmost segment represents countries contributing to research, with India, France, the United Kingdom, and the USA being the most prominent, as indicated by the thicker bands. These countries demonstrate strong academic output in areas related to supply chain management, big data, and analytics. The middle section showcases leading researchers such as Gunasekaran A, Dubey R, Kumar A, Mangla SK, and Childe SJ, indicating that much of the research output is concentrated among a select group of prolific scholars. Authors such as Gunasekaran A and Dubey R are shown to collaborate across multiple themes, which reflects their central roles in shaping emerging discussions. The rightmost column details thematic areas, with big data analytics, supply chain management, industry 4.0, sustainability, and ML being highly interconnected. This Sankey diagram demonstrates the evolution of research themes from geographic origins through influential scholars to thematic concentrations, highlighting the interdisciplinary and collaborative nature of modern supply chain and data analytics research. The diagram offers valuable insights into global contributions, researcher influence, and emerging hotspots in the field.

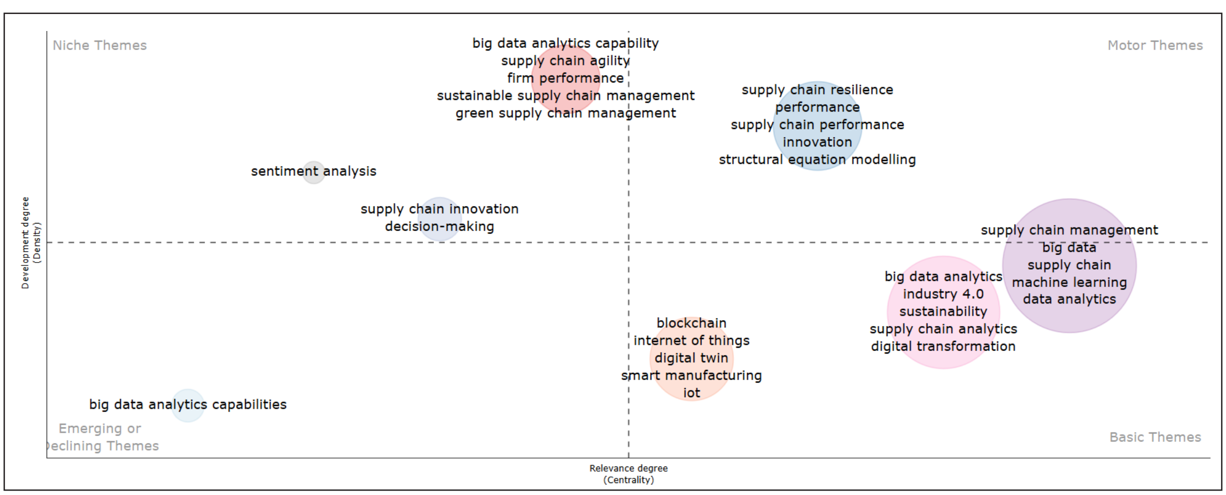


Fig. 8: Thematic Diagram Basis Co-Word Cluster Analysis

The attached image, Fig. 8, presents a thematic map based on co-word cluster analysis, which categorises themes across two dimensions: centrality (relevance) and density (development). This enables an understanding of the structure and maturity of research themes. In the upper-right quadrant (Motor Themes), we find well-developed and essential topics such as supply chain management, big data, machine learning, data analytics, and SCA. These are central and mature, indicating they are driving the field and are highly integrated. The lower-right quadrant (Basic Themes) contains emerging but central topics such as blockchain, IoT, digital twin, and smart manufacturing. These have strong relevance but are still developing, suggesting active exploration and growing interest. In the upper-left quadrant (Niche Themes), themes such as supply chain resilience, green supply chain management, and analytics capability are well-developed but have limited connections to other themes. These are specialised areas with a deep focus but lower general impact. The lower-left quadrant (Emerging or Declining Themes) includes BDA capabilities, signalling either a declining trend or a newly developing area yet to gain traction. This cluster analysis offers valuable insights into the maturity, relevance, and future potential of various research themes in supply chain and data analytics domains.

The attached image, Fig. 9, illustrates a thematic mapping through multiple correspondence analysis (MCA), representing the intellectual structure of research based on keyword co-occurrence. The axes, Dim 1 (26.35%) and Dim 2 (16.06%), explain the variance across keyword groupings, reflecting thematic proximity and conceptual associations. The right-hand side clusters contain highly relevant and interconnected themes such as supply chain resilience, firm performance, supply chain innovation, sustainability, and BDA capability.

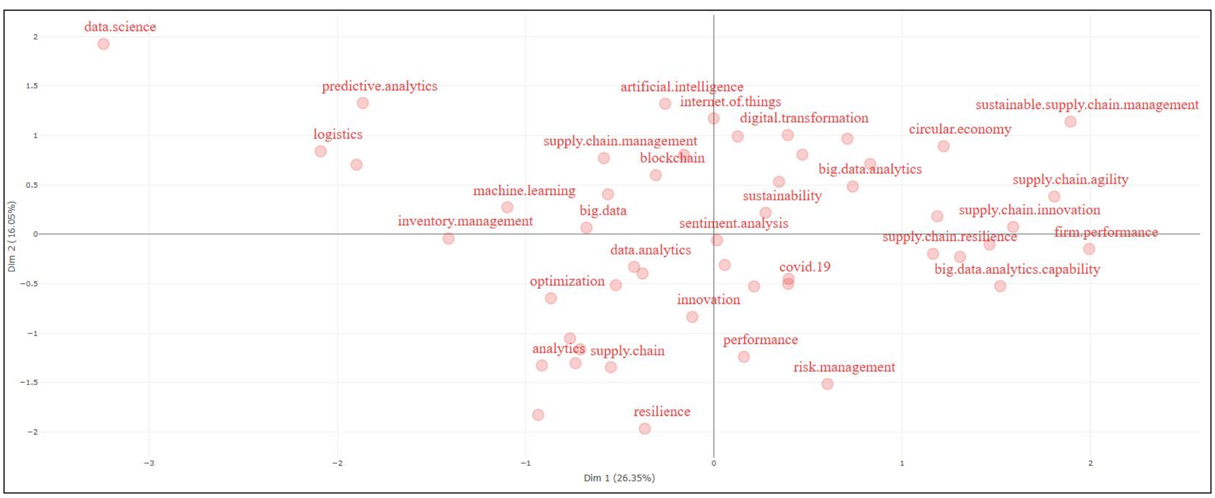


Fig. 9: Thematic Mapping Through Multiple Correspondence Analysis

This cluster suggests a strong research focus on enhancing supply chain adaptability and performance using digital technologies and sustainable practices. The central zone shows a convergence of core digital and analytical themes, including machine learning, blockchain, IoT, and digital transformation, indicating their foundational role across diverse subtopics. The left-hand side includes more isolated or foundational terms such as data science, predictive analytics, and logistics, suggesting traditional or independent research tracks. Data science is distant from the central cluster, possibly implying either foundational status or limited thematic overlap. This map reveals a strong emphasis on integrating digital innovation and resilience in supply chain research, with emerging attention to circular economy and AI. This visualisation effectively captures the evolving landscape and thematic interrelations in the field.

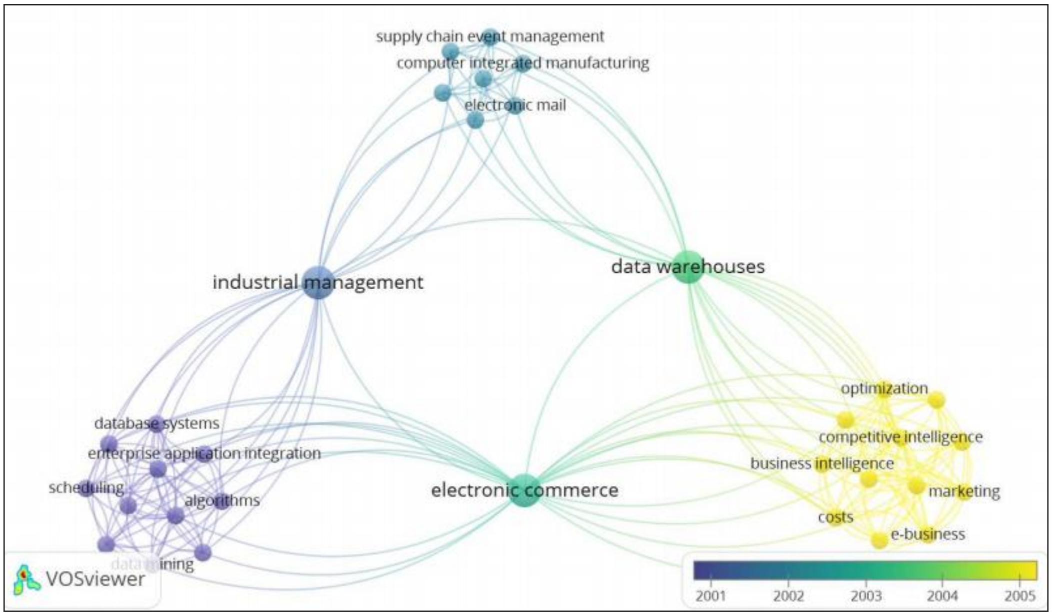


Fig. 10: Co-Occurrence 2001 to 2005 (VOSviewer)

The attached VOSviewer network visualisation, Fig. 10 shows keyword co-occurrence from 2001 to 2005, with colour indicating the average publication year. Industrial management and electronic commerce are central themes, acting as bridges among clusters. The purple cluster (2001) focuses on algorithms, data mining, and database systems, indicating foundational technological themes. The green cluster emphasises data warehouses and electronic mail, highlighting early digital infrastructure. The yellow cluster (2004–2005) includes e-business, business intelligence, and marketing, reflecting a shift towards strategic and commercial applications of IT. The map reveals a thematic evolution from technical foundations to business intelligence and optimisation.

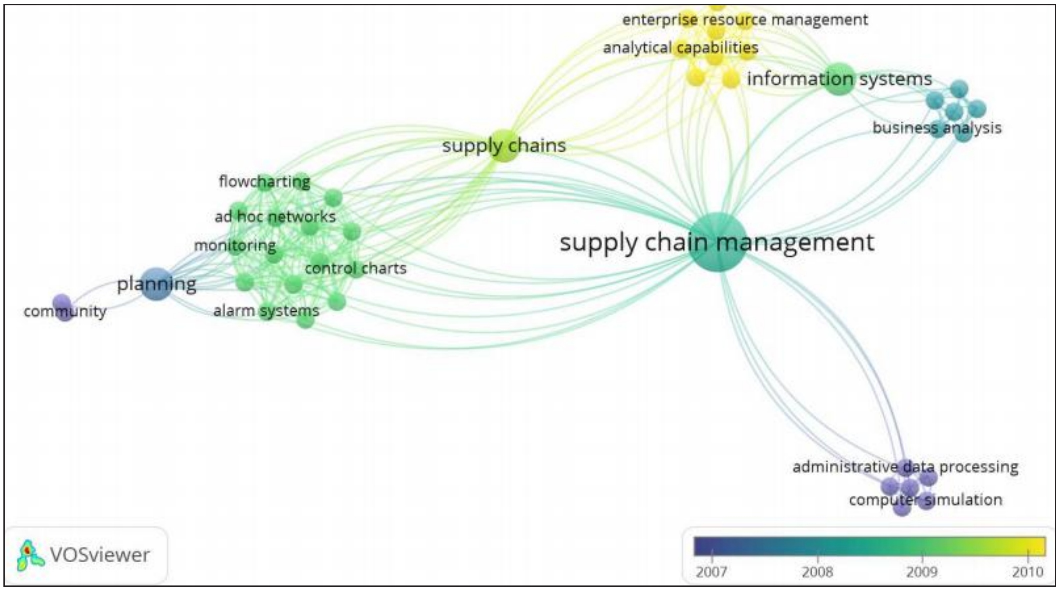


Fig. 11: Co-Occurrence 2006 to 2010 (VOSviewer)

Fig. 11, the VOSviewer map for 2006 to 2010, highlights the central role of supply chain management, which links closely with information systems, supply chains, and planning. The thematic evolution moves from foundational terms, such as community and computer simulation (2007, in blue), towards more strategic and analytical themes, including enterprise resource management and analytical capabilities (2009–2010, in yellow). Keywords such as control charts, alarm systems, and flowcharting reflect operational concerns, while business analysis and information systems show integration of IT tools. This period marks a shift from traditional planning to data-driven, integrated supply chain solutions powered by enterprise systems.

The VOSviewer map, Fig. 12, for 2011 to 2015 highlights big data and supply chain management as dominant and interconnected themes. The emergence of keywords such as predictive analytics, data mining, and visual analytics reflects the growing use of advanced data techniques in supply chain optimisation. The appearance of digital manufacturing, adaptive services, and the industrial revolution in blue indicates early discussions around Industry 4.0. Central themes in green and yellow, such as information management, competition, and education, demonstrate broader integration of data-driven strategies. This period marks a clear shift towards analytics-based, digital supply chain ecosystems driven by big data technologies.

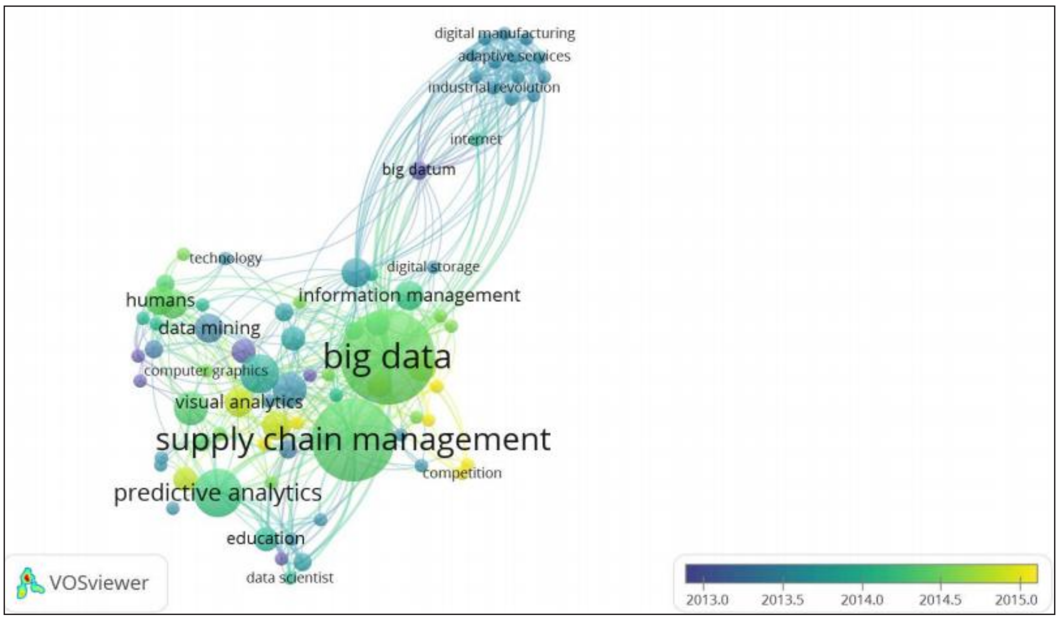


Fig. 12: Co-Occurrence 2011 to 2015 (VOSviewer)

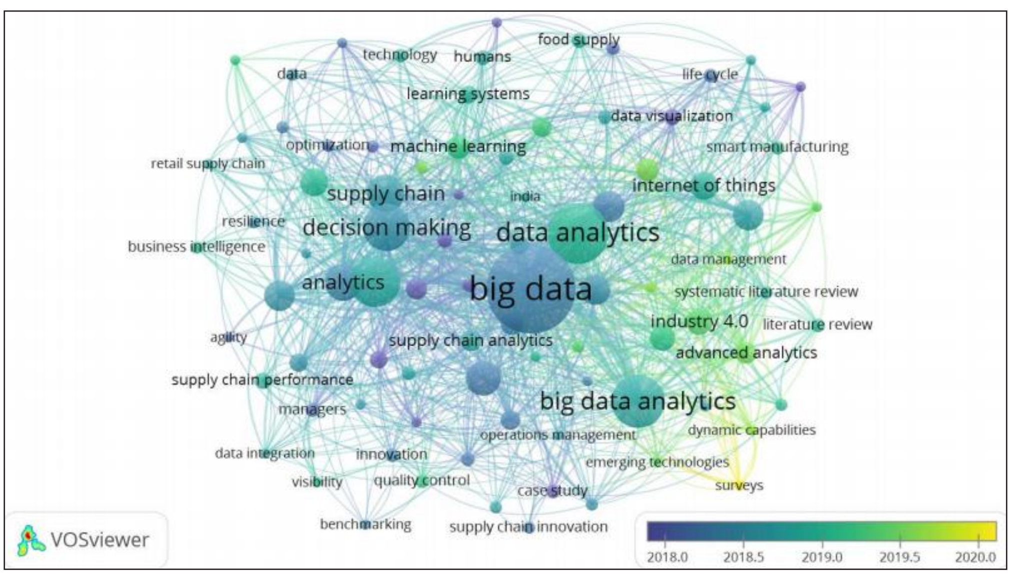


Fig. 13: Co-Occurrence 2016 to 2020 (VOSviewer)

The VOSviewer map for 2016 to 2020 highlights a robust convergence of data analytics and supply chain as core research themes. The emergence of I4.0, IoT and ML reflects increasing integration of intelligent technologies into supply chains. Newer terms such as smart manufacturing, data visualisation, and systematic literature review indicate a maturation of the field towards evidence-based insights. The high connectivity between terms such as decision-making, resilience, and innovation shows an interdisciplinary synergy (Fig. 13). This period emphasises advanced analytics for optimising supply chain performance, fostering agility, and enabling data-centric decision-making across industries.

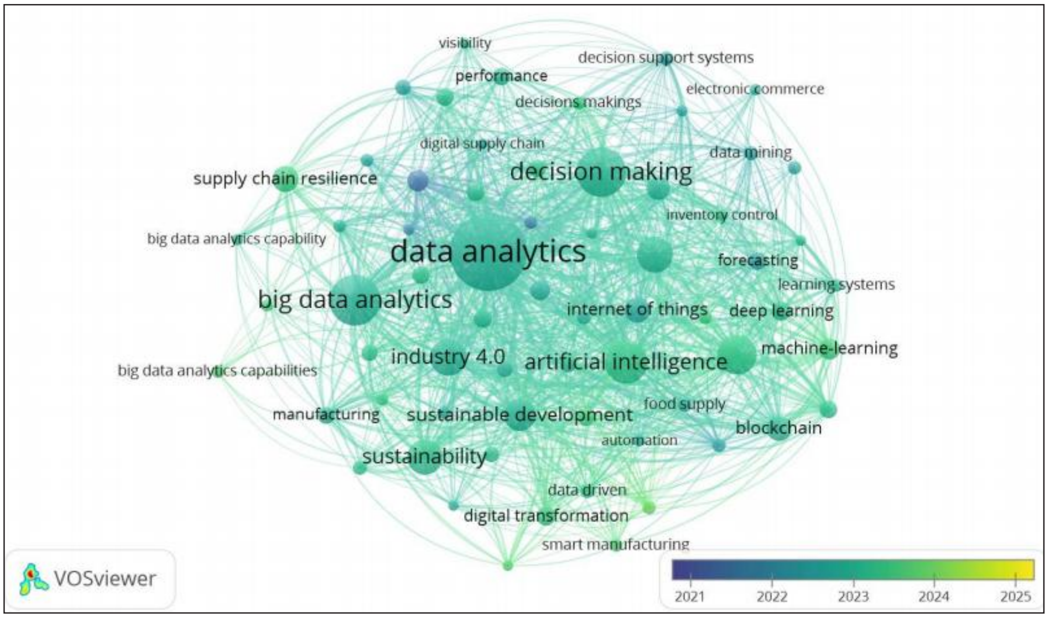


Fig. 14: Co-Occurrence 2021 to 2025 (VOSviewer)

The bibliometric map, Fig. 14, for 2021 to 2025 reveals a strong and dense research focus on data analytics, big data analytics, and decision-making within the context of supply chains. Central to the map are themes such as Industry 4.0, AI, and sustainability, indicating their integration into modern supply chain frameworks. Keywords such as IoT, ML, digital transformation, and smart manufacturing demonstrate the technological evolution of supply chains towards data-centric automation and intelligence.

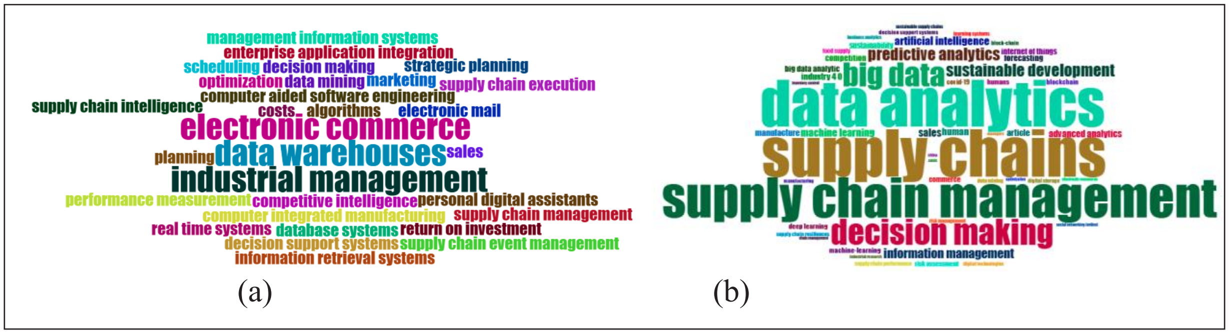


Fig. 15: Transformation Over the Decade and New Emerging Trends from (a) to (b)

New emerging trends, Fig. 15, include a focus on sustainable development, digital supply chains, and data-centric decision-making. The inclusion of blockchain, deep learning, and automation reflects the rise of intelligent, transparent, and autonomous systems. Concepts such as supply chain resilience and BDA capabilities signal growing interest in building agile and robust supply chains, especially post-pandemic. The dense interconnections among keywords imply a high level of interdisciplinarity. Topics such as forecasting, learning systems, inventory control, and performance align with a broader goal of enhancing operational efficiency and long-term strategic planning. Overall, this period marks a shift towards intelligent, sustainable, and resilient supply chains, leveraging cutting-edge analytics and emerging technologies for competitive advantage.

Limitation and Future Research Suggestion

Despite offering comprehensive insights, this bibliometric analysis has several limitations. First, the study exclusively relied on the Scopus database, which, while extensive, may have excluded relevant literature indexed in Web of Science, IEEE Xplore, or Google Scholar, leading to potential data omission. Second, bibliometric analysis is inherently quantitative and does not capture the qualitative depth or contextual nuances of the publications reviewed. Third, issues such as author name disambiguation, keyword variation, and incomplete affiliation data may have impacted the accuracy of network and trend analyses, despite pre-processing efforts. The use of VOSviewer is limited to metadata-driven insights; it does not evaluate the theoretical or practical contributions of individual studies in depth. Finally, while the dataset includes future publications projected to 2025, these entries may be subject to change or removal by publishers. Future research could address these limitations by integrating multi-database searches, incorporating content analysis or ML-based text mining, and exploring domain-specific case studies. Researchers are also encouraged to examine the impact of emerging technologies such as blockchain, quantum computing, and generative AI in SCA.

Declaration: This research paper is an extension of a conference proceeding (Shrivastav & Shah, 2025).

Conclusion

This study presents a comprehensive bibliometric analysis of 1,405 scholarly publications on SCA, spanning the period from 2001 to 2025. Leveraging tools such as VOSviewer, and R Programming, the research maps the intellectual, thematic, and collaborative landscapes of the SCA domain. The findings of this investigation offer critical insights into the dynamic growth and transformation of SCA, especially in light of technological innovations and the shift toward data-centric supply chain management. The analysis reveals a marked surge in research activity after 2010, coinciding with the widespread adoption of big data, AI, and ML in operational decision-making. These technologies have not only accelerated the digital transformation of supply chains but have also diversified research interests across themes such as predictive analytics, sustainability, risk management, supply chain visibility, and real-time analytics.

Through co-authorship and citation analyses, this study identifies key contributors, prolific institutions, and impactful journals that have shaped the field, underscoring the global and interdisciplinary nature of SCA research. The keyword co-occurrence network reveals that earlier research was predominantly focused on traditional optimisation models and linear programming. At the same time, recent studies have shifted attention toward IoT, blockchain integration, resilience, and AI-based forecasting models. This thematic evolution reflects the transition from static, siloed systems to dynamic, interconnected supply chain ecosystems that prioritise agility, responsiveness, and transparency. The use of Biblioshiny package highlights several emerging frontiers in the field, including real-time decision support, digital twins, and cognitive supply chains, suggesting a forward-looking trajectory that integrates cyber-physical systems and edge analytics. These findings provide empirical evidence of how SCA is evolving from a decision-support function to a strategic enabler of value creation in the Industry 4.0 context.

From a practical standpoint, the study's insights hold significant implications for academia, industry, and policymakers. For scholars, the results offer a consolidated view of past and present research trends, aiding in the identification of underexplored areas and facilitating hypothesis development for future studies. For practitioners, the study underlines the importance of investing in advanced analytics capabilities and highlights best practices adopted by leading organisations worldwide. Policymakers can use these findings to support digital transformation initiatives and encourage academia-industry collaborations to bridge knowledge gaps.

While the study makes meaningful contributions, it is not without limitations. The exclusive reliance on Scopus-indexed publications may have resulted in the exclusion of relevant articles from other databases. Additionally, while bibliometric tools offer powerful visualisation and clustering capabilities, they are inherently limited in providing qualitative insights into research depth and practical impact. Future studies could address these gaps by integrating content analysis, systematic literature reviews, and case-based investigations. This bibliometric study not only synthesises two decades of global research on SCA but also highlights the field's progression towards more intelligent, data-centric, and adaptive supply chain paradigms. As supply chains continue to grapple with complexity, uncertainty, and digital disruption, the role of analytics will only become more vital positioning SCA as a cornerstone of competitive advantage and sustainable performance in the years ahead.

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