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SYSTEMATIC LITERATURE REVIEW ON SUPPLY CHAIN MANAGEMENT IN CIVIL LOGISTICS: TECHNOLOGICAL IMPLICATIONS AND VULNERABILITIES

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Abstract: *This paper presents a systematic literature review of civil supply chain management (SCM) from 2010 to 2025, aiming to capture key developments, research gaps, and emerging directions. Using bibliometric analysis of Scopus data processed through VOSviewer, five major thematic clusters were identified: sustainability and green supply chains, digital transformation (Industry 4.0/5.0), risk management and resilience, supply chain integration and performance, and socio-economic dimensions such as food security and humanitarian logistics. The review of 30 high-impact empirical studies highlights the increasing relevance of sustainable practices, the balance between efficiency and resilience, and the transformative influence of blockchain, big data, and artificial intelligence. Findings indicate a paradigm shift in SCM, from cost-centered approaches to multidimensional frameworks integrating economic, environmental, social, and resilience objectives. Despite significant advances in green SCM and digitalization, gaps persist in social sustainability and the integration of resilience with sustainability. Future research is expected to design resilient, sustainable, and digitally enabled supply chain models capable of addressing global disruptions.*

Keywords: *supply chain management, resilience, sustainability, Industry 4.0, bibliometric analysis, logistics, digital transformation.*

1. INTRODUCTION

In today's global economy, supply chains (industrial and commercial) have become increasingly complex and interconnected. Supply Chain Management (SCM) is a critical component for the competitiveness of firms, as it integrates suppliers, production, distribution and customers into a unified system. In recent decades, the field of civil SCM has experienced significant expansion, both in practice and in scientific research. The period 2010–2025 was marked by major challenges, from market volatility and the increase in the complexity of global networks, to unprecedented crises such as the COVID-19 pandemic, which severely disrupted logistics flows. These events highlighted the importance of resilience and adaptability of supply chains and stimulated academic interest in new topics, for example, digitalization or supply chain sustainability.

The specialized literature reflects this evolution.

From the traditional focus on cost efficiency and chain integration (e.g. just-in-time programs and inventory reduction), research has expanded to emerging areas such as green and sustainable supply chains, risk and chain continuity management (resilience), and the digital transformation of logistics (Industry 4.0, IoT, AI, etc.). At the same time, concerns about social responsibility and reducing the carbon footprint along the logistics chain have gained increasing importance, under the pressure of environmental regulations and consumer demands. These diverse research directions have generated a large volume of publications, but also gaps: for example, the integration of sustainability and resilience dimensions or the insufficient approach to social aspects in SCM have been identified as areas of deficiency [1].

Given the dynamics and complexity of the field, a systematic literature review is required to synthesize current knowledge and identify major research directions, existing gaps, and emerging trends in civil supply chain management. This study aims to provide such a synthesis, focusing on the period 2010–2025. We will use a two-stage approach: first, a detailed bibliometric analysis of relevant publications performed with VOSviewer software to map the scientific landscape, the analysis of which will include co-citation networks, keyword co-occurrence, temporal trends, and then an in-depth empirical review of 30 high-impact scientific articles to extract qualitative results and discuss major contributions.

2. METHODOLOGY

Bibliometric research is an essential tool in exploring and mapping the scientific landscape, providing a clear perspective on the evolution and trends in a field of study. In this scientific paper, bibliometric analysis will be carried out using the VOSviewer software, with the main objective of identifying the main research directions, the connections between fundamental concepts, and the relevant contributions to the management of the supply chain.

By using a prestigious database such as Scopus, the research will apply advanced analysis methods, such as keyword co-occurrence, citation analysis, and temporal distribution of publications.

We decided to choose the Scopus database because of its extensive coverage and the rigorous selection it conducts on all works. The Scopus database indexes over 27,000 journals from multiple fields, thus providing access to high-quality publications and a transdisciplinary understanding of certain areas of interest. Compared to other databases such as Google Scholar or Web of Science, it offers a balance between the quality of content and the breadth of indexing, making it a strategic choice for any scientific researcher.

These methods allow highlighting the dominant thematic clusters, the most influential states in this field of research, and the relationships between the different directions of study. Visualizing the results through bibliometric networks and heat maps will facilitate a deeper understanding of the dynamics of the field and how it has evolved over time.

The research methodology met the proposed objectives by following the steps below:

- Step 1 – Selection of the bibliographic database: The data collection process uses the Scopus database, selected for its significant and representative role in the bibliometric study. The research was carried out in February 2025.
- Step 2 – Establishment of filtering criteria: The subject was analyzed using a keyword search. This was performed 2 times, refining the list of keywords based on the results seen in the previous analysis. The filters used were in terms of limiting the language to English and considering only published scientific articles, excluding conferences, book chapters, reviews, books, news, notes, and discussions. The first search was performed using the phrase “supply” AND “chain” AND “management”. Based on the first search, the second was performed using “civil" AND “supply” AND “chain” AND “management”. Thus, a narrowing of the scope and a focus on the most relevant content could be concluded.
- Step 3 – Data collection from Scopus: the first and largest data set collected was 90,696 documents, all of which were in English, covering the period 1982-2025, from which we selected the first 20,000 documents, the most representative of these in descending order of the number of citations.
- Step 4 – Exporting the results: The Microsoft Excel Comma Separated Values File (.csv) was chosen to export the “Complete records and cited references”. Each analysis generated a .csv file, so the research used 2 files.
- Step 5 – Data cleaning and preparation: The CSV file was imported into

VOSviewer. Terms were unified by creating a thesaurus file, for example, to handle synonyms, abbreviations or singular/plural forms of the same concepts. Such normalizations "supply chains" and "supply chain" were unified, as well as "IoT" and "Internet of Things", ensured increased accuracy of the analysis, avoiding artificial division of nodes in the network. We retained in the analysis only keywords that appeared at least 5 times in the dataset, filtering out terms that were mentioned too rarely.

- Step 6 – Creation of the thesaurus file: To ensure a high-quality representation and analysis of the keywords, synonymous terms were identified, including singular and plural forms and compound forms. Through this procedure, the quality of the keywords was greatly improved, thus forming the foundation for automatically generated maps based on the bibliographic data.
- Step 7 – Analysis of the processed data in VOSviewer: The objective of the VOSviewer analysis was to cluster the keywords and improve them over the three analyses performed.

The entire process has been schematized and illustrated in Figure 1, making the entire bibliometric analysis process much easier to see and comprehend.

For the literature review, the empirical research analyzed is classified, analyzed, and synthesized from empirical articles published in high-impact publications, the aim being to generate broad perspectives for both scientists and especially practitioners, suggesting future research directions. The analytical approach we adopted to review the literature focused on empirical research in this field that would allow us to cover a relatively recent period 2014-2025. Through this descriptive literature review method, we can draw conclusions based on the selected papers, followed by summarizing the results obtained, synthesizing them, and classifying them.

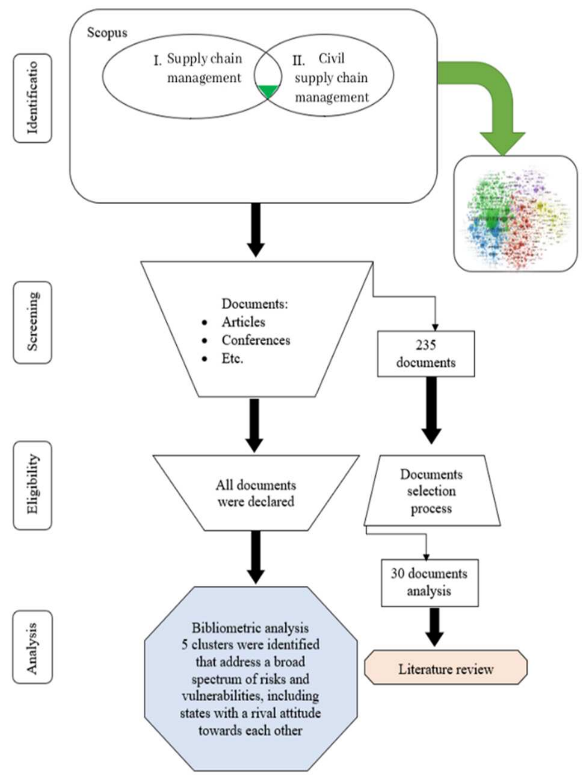

Fig. 1. Flowchart of the bibliometric analysis process.

For the selection of papers within the sub-chapter dedicated to literature reviews, we decided to select and analyze only relevant papers in English. Another basic criterion was to select current scientific papers published in relevant and high-impact publications. Also, as previously mentioned, the query period was limited to the years 2014-2025, thus wanting to offer and capture the novelty and innovation in this field. The review of these selected papers in order to determine the current state of scientific knowledge was a laborious process through which we wanted to extract and analyze the most relevant and impactful contributions in this field.

Subsequently, these papers were critically analyzed and synthesized according to the best practices of systematic review, in the spirit of the PRISMA guideline [2].

The review process followed five fundamental steps: (1) searching for articles (according to the mentioned criteria), (2) selection based on relevance and quality, (3) thematic classification of studies, (4) detailed analysis of the content of each study, and (5) synthesis of the results, highlighting convergences, contradictions, gaps and future directions suggested by the authors.

By applying this combined methodology, the present research ensures both quantitative objectivities, through bibliometrics and qualitative depth. In the following, we will present the results obtained in two sub-sections: first results of the bibliometric analysis, then results of the literature review, followed by the general conclusions of the study.

3. RESULTS

3.1 Results of bibliometric analysis

Based on documents collected from the Scopus database and processed through the VOSviewer bibliometric analysis software, three extensive analyses were generated that provided us with the aspects necessary to generate final conclusions.

This query is also the scientific basis from which we selected the most relevant 30 scientific papers on which we conducted the literature review.

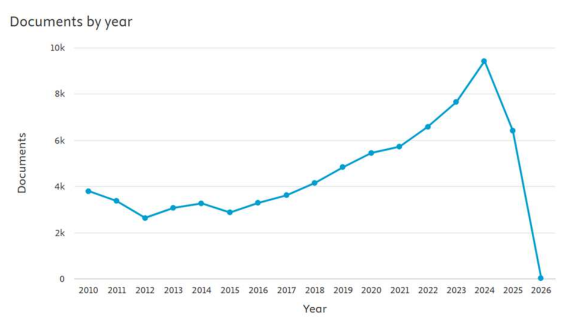

Fig. 2. Scopus documents identified after setting the filters

Using the keywords "supply chain" AND "management" a query was performed, and 76.063 documents were analyzed and processed.

Analyzing Figure 2, bibliometric analysis confirmed a continuous increase in academic interest in civil supply chain management during the period 2010–2025 [3]. The number of articles published annually on SCM did not register significant decreases, but on the contrary, had a pronounced upward trend towards the end of the interval. Between 2010 and 2015, scientific production remained relatively constant, around 3000–4000 articles per year, but after 2018 a jump is observed, exceeding 4000 articles annually, and by 2020 reaching over 6000 annually. This increase coincides with the intensification of current topics as big data or Industry 4.0. A notable peak in publications is noted in the period 2020-2021, explainable by the increased attention paid to supply chains under the impact of the COVID-19 pandemic. The pandemic shock has exposed critical vulnerabilities in global supply chains, from medical equipment shortages to transportation bottlenecks, which has generated numerous studies on managing disruptions and increasing resilience. Recent geopolitical events (e.g. international trade tensions) have also fueled researchers interest in topics such as the security of supply of critical raw materials. The general trend highlighted by the data is of a maturation and diversification of the SCM field, reflected in the increasing volume of knowledge produced.

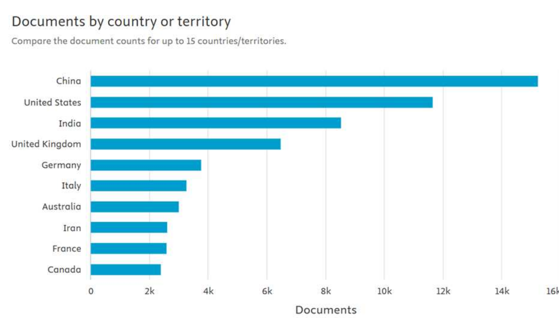

Fig. 3. Top 10 countries in scientific contribution

Analyzing Figure 3, the top three contributing countries in the period 2010–2025 are China, United States and India, which together generated over half of all papers. China ranks first in terms of percentage of publications (~26.5% of the world output), closely followed by the USA (approx. 24.8%) and then India (~13.1%). It is worth noting the frequent academic cooperation between these countries for example, the USA collaborates intensively with China and the India at the co-author level, forming a core of the global research network. Other countries with significant contributions include UK, Germany, Italy, Iran and Australia, reflecting varied regional interests (Europe often focused on sustainability, Asia on operational management and technology, etc.). A notable aspect is the absence of African countries in the top 20 contributions, suggesting an untapped potential and the need for greater involvement of African institutions in SCM research.[4]

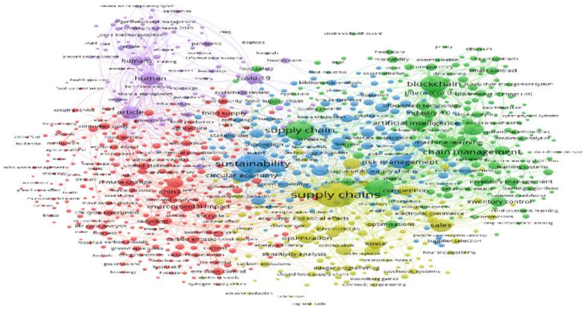

Fig. 4. Network representation

The analyzed data highlighted 5 clusters, which can be seen in Figure 4 and interpreted as follows:

- Yellow Cluster: This cluster highlights the importance of logistics and supply chain management in the context. Terms such as “supply chains”, “cost” and “decision support systems” suggest that the focus is on optimizing the flow of materials and resources to support operations. “Decision making” and “resilience” indicate that in the civilian environment decisions must take into account complex risks and geopolitical, logistical, and technological factors.
- Green Cluster: This cluster focuses on network security and protection against cyber-attacks, with a particular interest in the civilian environment. Cybersecurity is critical, especially when it comes to protecting supply chains and critical infrastructures, delving into terms such as “cybersecurity”, “cyber-attacks” or “crimes”. “Blockchain” is a relevant term in this cluster, suggesting the use of emerging technologies to ensure the integrity, traceability, and security of data[5].
- Blue Cluster: The blue cluster brings risk in management operations. “Risk assessment”, “Risk management”, “sustenability” and “circular economy” are central terms that emphasize the need for effective planning to manage operational risks. Terms such as “disasters” and “systems engineering” show a concern for integrating systems engineering into crisis management processes.
- Purple Cluster: The purple cluster explores the human dimension of supply chains. The terms “humans” and “covid-19” suggest a heightened focus on personnel, while “human” and “article” reflect research involving the health and well-being of the nations.
- Red Cluster: This cluster focuses on the connections between national security and international trade, with a special focus on critical resources such as “rare earths.”[6] The presence of the terms “China” and “United States” suggests a strategic interest in the geopolitical competition for these essential resources, and “national security” reflects the importance of these issues for defense policy.

Overall, the keyword networks confirm that between 2010–2025, research in civil SCM focused mainly on three major directions: (1) Environmental sustainability in supply chains (including circular economy), (2) Digitalization and new technologies (SCM 4.0), and (3) Risk management and chain resilience. At the same time, the fundamental theme of performance optimization remains a common thread, and new topics such as social sustainability, humanitarian chains or the integration of Industry 5.0 concepts as human-centric orientation and holistic sustainability are starting to make their way, foreshadowing future development directions.

Regarding the temporal analysis of keywords that we can observed over the time periods mentioned as follows:

- 2010–2015: Grounding sustainability and risk management. Civil SCM moves beyond efficiency: sustainability and risk management enter. Globalization increases complexity, driving resilience and transparency. Explosion of SSCM research after 2010; “green supply chain” becomes mainstream.
- 2016–2019:Digitalization, technological innovations and circular economy. Industry 4.0 brings IoT, Big Data, cloud and automation for visibility/efficiency. First AI applications (forecasting,

routing) appear; academic interest grows. Blockchain (after 2017) for traceability, transparency and trust between partners. Circular economy moves from “green” to closed-loop; the ground is being prepared for agile chains.

- 2020–2022: The shock of the COVID-19 pandemic and the focus on resilience. COVID exposes the fragility of JIT; resilience becomes a strategic priority. Strategies: diversification of sources, buffer stocks, vertical collaboration. End-to-end visibility (IoT, data platforms) and accelerated digitalization. The dual focus is crystallizing: resilience + sustainability in the redesign of chains.
- 2023–2025: Post-pandemic consolidation and new technological horizons.
  Transparent, traceable, resilient and efficient networks become the new standard. The war in Ukraine amplifies risks; nearshoring/re-shoring and buffer stocks grow. ESG and net-zero impose carbon measurement and circularity; blockchain remains in pilot projects. AI (including gen AI) coordinates decisions in real time; chains become digital, intelligent and sustainable.

In essence, the modern supply chain is becoming digital, intelligent, and sustainable, supported by trusted partnerships between actors. Combining the lessons of the past decade and a half, today’s civilian supply chains aim to be not just lean, but also agile and antifragile, not just profitable, but also sustainable. This ongoing transformation reflects the industry’s adaptation to an increasingly volatile and complex global environment, where technological adaptability and innovation are becoming as important as traditional operational excellence.

3.2 Results of the literature review

The research covers a wide range of sectors and methodological perspectives, from quantitative optimization and data-driven analysis to empirical case studies and integrative analyses. Although our scope is strictly civil SCM, we adopt both a multidisciplinary and interdisciplinary stance so that adjacent interfaces, public policies, critical infrastructure, dual-use providers, are visible where they shape civil network.

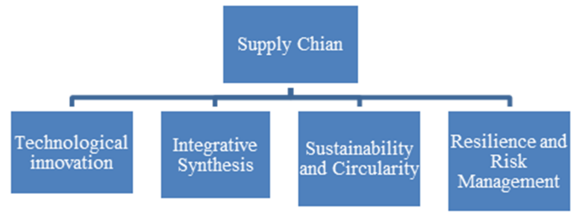

Fig. 5. Map of concepts encountered in the literature review

Technological innovation

Across the corpus, digital transformation is the headline shift. Studies show that advanced analytics and AI sharpen demand forecasting, inventory control, and planning under uncertainty—machine-learning models often beating classic heuristics; this includes work by Wamba and colleagues, Leuschner and co-authors, and others [7], [8], [9], [10]. IoT deployments, sensors on assets, pallets, and shipments, lift end-to-end visibility and enable exception-based control (for instance, temperature or delay alerts) [11]. Blockchain is repeatedly presented as a practical tool for traceability and tamper-proof provenance in food, pharma, and other high-value chains, especially when applied to narrow, well-governed use cases [11]. At the same time, authors warn about the usual pitfalls: cybersecurity, interoperability, and data quality.

The consensus is that the biggest performance gains appear when technology goes hand-in-hand with process redesign and capability building.

Sustainability and circularity

From the early 2010s onward, research moves beyond isolated "green" actions to systemic SSCM that embeds environmental and increasingly social, objectives in network design and operations, meta-analyses and sector studies (e.g., Carter; Sarkis; Govindan) link eco-design, green procurement, supplier development, and reverse logistics to better firm performance [12], [13]. Closed-loop and circular chains are modeled with multi-objective and fuzzy optimization to balance emissions, cost, and service, and case work shows that integrating return flows (repair, remanufacture, recycling) lowers footprint and can generate net economic value at scale [14],[15]. Trade-offs remain context-dependent for example, local vs. global sourcing, and most authors stress governance standards, audits, data transparency as the key to scaling beyond pilots [16] .Finally, Scope-3 decarbonization and net-zero commitments increasingly shape supplier selection and multi-tier emissions accounting [14], [17].

Resilience and risk management.

Disruption-focused work accelerates after 2020. Three recurring design principles stand out. First, visibility and sensing: real-time data (IoT, platforms, supplier portals) plus predictive analytics enable earlier detection and faster re-planning [11], [18].

Second, structural options: multi-sourcing, qualified backups, postponement, and flexible capacity reduce single-point failures [19], [20]. Third, targeted buffers at critical echelons sustain service at acceptable cost [19]. Research on the ripple effect quantifies how shocks propagate across tiers and shows that coordinated recovery (prioritized allocation, dynamic rerouting) beats isolated reactions. Security-oriented studies also flag supply-chain-specific cyber and physical vulnerabilities and advocate controls that extend beyond the enterprise boundary.

Overall, resilience appears as a composite capability—technological, structural, and collaborative—best developed through routine exercises (war-gaming, stress tests), not ad-hoc firefighting [19].

Policy and organizational influences

Well-crafted policies can speed up digitalization and sustainability as pilot programs, green subsidies, and disclosure/ standards that harmonize data, a point made across several natural-experiment designs [12], [21]. Evidence ties these instruments to higher innovation investment and better environmental performance, especially among large firms with stronger absorptive capacity [21]. By contrast, fragmented or heavy-handed rules risk high compliance costs with little network-level benefit [10]. Inside firms, data governance, cross-functional integration, and supplier development mediate technology returns, SMEs face resource and institutional gaps that call for targeted support as shared platforms, training, finance. Cross-tier collaboration and aligned incentives appear again and again as prerequisites for successful digital/green transitions.

Integrative synthesis.

The field has matured from cost-centric optimization to a multi-objective paradigm: technology (AI/ML, IoT, blockchain) adds new levers like sustainability broadens goals resilience addresses a more volatile risk landscape and policy/organization creates the enabling conditions [17]. Performance frontiers shift most when these elements are co-designed using AI-enabled visibility to place buffers selectively in low-carbon networks, or leveraging blockchain traceability to meet regulatory and customer transparency while streamlining recalls and audits [7], [14]. Methodologically, hybrid approaches data-driven learning plus prescriptive optimization and econometrics improves both external validity and operational relevance[22].

4. CONCLUSION

Although we wanted to achieve a structured approach to the specialized literature, our review has certain limitations. The study was based only on the relevant literature published in the Scopus database, and the articles selected in the review process were only those that we considered relevant, therefore, the review of the specialized literature is far from being complete and exhaustive. This review of thirty top-cited studies (2010–2025) on civilian supply chain management (SCM) reveals four interrelated thematic domains driving the field's evolution: technological innovation, sustainability and circularity, resilience and risk management, and policy and organizational enablers. Across these domains, the literature converges on a vision of supply chains that are digitally transformed, environmentally and socially responsible, shock-resistant, and supported by conducive governance and organizational practices. The synthesis of these high-impact works provides a holistic understanding of contemporary SCM, bridging conceptual silos and highlighting both achievements and lingering gaps.

Technological innovation emerges as a dominant theme, underscoring the profound impact of advanced technologies on SCM. Over the past decade, researchers document how Industry 4.0 and related innovations have ushered in the era of "Supply Chain 4.0," characterized by real-time data integration, automation, and intelligent decision-making. These technologies have improved operational efficiency, agility, and transparency, enabling firms to better anticipate and respond to disruptions. The sustainability and circularity theme reflects the growing imperative to integrate environmental responsibility into SCM. Influential works during 2010–2025 expanded the scope of supply chain performance beyond cost and efficiency, embedding the principles of sustainable supply chain management (SSCM) and the circular economy. Firms are urged to reduce carbon footprints, eliminate waste, and adopt life-cycle approaches such as product reuse, remanufacturing, and recycling to "close the loop" of supply chains. The review indicates that implementing circular strategies not only addresses ecological concerns but can also improve long-term resilience: for example, diversifying sourcing with recycled materials or designing products for disassembly can buffer against raw material shortages.

The resilience and risk management theme has gained prominence as global supply chains face unprecedented volatility. The literature stresses that disruptions, from natural disasters and pandemics to political conflicts, expose critical vulnerabilities in tightly coupled, lean supply networks.

In response, highly cited works have developed frameworks for supply chain resilience, emphasizing capabilities such as redundancy, flexibility, agility, and collaboration to withstand and recover from shocks.

The fourth theme, policy and organizational enablers, cuts across the above domains by examining the external and internal conditions that facilitate effective supply chain management. On the policy side, research shows that government regulations, public standards, and broader socio-economic policies significantly influence SCM practices. For example, environmental regulations and carbon pricing mechanisms have spurred companies to adopt greener supply chain practices, while trade policies and geopolitical shifts can reconfigure global sourcing and logistics networks. The literature also points out that supportive public policy can act as an enabler of innovation and sustainability, whereas misaligned or protectionist policies may hinder supply chain efficiency.

Internally, organizational factors are critical: top management commitment, workforce skills, interdepartmental coordination, and an organizational culture open to change all determine how successfully new technologies or sustainability initiatives are implemented.

Theoretically, this review bridges previously fragmented streams of literature, illustrating how technological innovation, sustainability, resilience, and policy/organizational context interconnect in shaping supply chain outcomes. By synthesizing evidence from diverse high-impact sources, it contributes an integrative framework that researchers can use to interpret how 21st-century supply chains function as complex socio-technical systems.

As future research directions, based on the identified gaps and emerging trends, there are several directions that warrant further investigation to advance knowledge about SCM. A crucial direction is the integration of resilience and sustainability into supply chains. Researchers should develop models and frameworks that jointly optimize these objectives, resolving the apparent tension between efficiency-oriented sustainability and redundancy-based resilience. There is a clear call for innovative strategies, such as circular economy practices that also bolster buffer capacity, or risk mitigation plans aligned with carbon reduction goals, to achieve "win–win" outcomes where supply networks are both robust against disruptions and environmentally sustainable.

Additionally, further inquiry into the role of public policy and governance on supply chain outcomes is warranted. In pursuing these directions, future research will enhance the field's comprehensiveness and relevance, moving towards supply chain models that are technologically advanced, sustainable in the broadest sense, resilient to shocks, and bolstered by supportive organizational and institutional frameworks. Ultimately, addressing these research gaps will help realize supply chains that not only deliver competitive advantage and efficiency, but also contribute positively to society and withstand the uncertainties of a changing world.

5. REFERENCES

[1] H. Fang, F. Fang, Q. Hu, and Y. Wan, "Supply Chain Management: A Review and Bibliometric Analysis," *Processes*, vol. 10, no. 9, p. 1681, Aug. 2022, doi: 10.3390/pr10091681.

[2] M. J. Page *et al.*, "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews," *BMJ*, p. n71, Mar. 2021, doi: 10.1136/bmj.n71.

[3] H. Fang, F. Fang, Q. Hu, and Y. Wan, "Supply Chain Management: A Review and Bibliometric Analysis," *Processes*, vol. 10, no. 9, p. 1681, Aug. 2022, doi: 10.3390/pr10091681.

[4] P. Andra-Ioana, "CHINA'S SMART POWER IN INTERNATIONAL RELATIONS," presented at the International Scientific Conference "Strategies XXI," Bucharest, 2021.

[5] D. O. Badea, D. C. Darabont, L.-I. Cioca, A. Trifu, and V.-A. Barsan, "BLOCKCHAIN TECHNOLOGY FOR ENHANCED TRACEABILITY AND SUSTAINABILITY OF PERSONAL PROTECTIVE EQUIPMENT IN ROMANIAN AGRICULTURE," *INMATEH Agric. Eng.*, pp. 543–553, Dec. 2024, doi: 10.35633/inmateh-74-48.

[6] Y. Li, X. Zhang, S.-E. Stan, and T. Chang, "The impact of natural resources on sustainable development in China: A critical analysis of globalization and renewable energy," *Resour. Policy*, vol. 86, p. 104193, Oct. 2023, doi: 10.1016/j.resourpol.2023.104193.

[7] A. Torkabadi, M. M. Mamoudan, B. Erdebilli, and A. Aghsami, "A multi-objective game theory model for sustainable profitability in the tourism supply chain: Integrating human resource management and artificial neural networks," *Syst. Soft Comput.*, vol. 7, p. 200217, Dec. 2025, doi: 10.1016/j.sasc.2025.200217.

[8] M. Budhathoki *et al.*, "Market dynamics and E-commerce satisfaction in China's aquatic food sector: Machine learning and data insights," *Aquaculture*, vol. 610, p. 742904, Oct. 2026, doi: 10.1016/j.aquaculture.2025.742904.

[9] S. Chakrabarty *et al.*, "Application of artificial intelligence in insect pest identification - A review," *Artif. Intell. Agric.*, vol. 16, no. 1, pp. 44–61, Mar. 2026, doi: 10.1016/j.aiia.2025.06.005.

[10] I. M. Coniglio, A. Cimino, and V. Corvello, "Artificial Intelligence and the Future of Supply Chain Management," in *Research and Innovation Forum 2024*, A. Visvizi, O. Troisi, V. Corvello, and M. Grimaldi, Eds., in Springer Proceedings in Complexity. , Cham: Springer Nature Switzerland, 2026, pp. 43–52. doi: 10.1007/978-3-031-78623-5_4.

[11] A. Kumar Karlapati, R. Karnati, K. L. Raghavender Reddy, and R. Uma Mageswari, "Blockchain and IoT-Driven Vaccine Supply Chains Promoting Secure and Transference with Machine Learning-Enhanced Demand Forecasting," in *Intelligent Systems with Applications in Communications, Computing and IoT*, vol. 621, K. Dahal, R. J. V. R., and S. K. G. A. E., Eds., in Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, vol. 621. , Cham: Springer Nature Switzerland, 2026, pp. 207–218. doi: 10.1007/978-3-031-92614-3_16.

[12] M. Chen, X. Tan, J. Zhu, and R. K. Dong, "Can supply chain digital innovation policy improve the sustainable development performance of manufacturing companies?," *Humanit. Soc. Sci. Commun.*, vol. 12, no. 1, p. 307, Mar. 2025, doi: 10.1057/s41599-025-04601-9.

[13] S. A. Boateng, X. Jiancheng, F. A. Karikari, G. M. Sackitey, and K. D. Moro, "Resource dependencies, market concentration, trade barriers and green technology deployment: A comparative analysis of solar, wind, and hydropower installation patterns," *Renew. Energy*, vol. 255, p. 123479, Dec. 2025, doi: 10.1016/j.renene.2025.123479.

[14] H.-W. Hsu and Y.-H. Lo, "Innovative sustainable cold chain evaluation model: Application to the aquaculture sector," *Environ. Dev.*, vol. 57, p. 101319, Jan. 2026, doi: 10.1016/j.envdev.2025.101319.

[15] S. Chaudhary, A. K. Saha, and M. K. Sharma, "A circular economy based nonlinear

corrugated waste management system using Fermatean bipolar hesitant fuzzy logic," *Sci. Rep.*, vol. 15, no. 1, p. 7099, Feb. 2025, doi: 10.1038/s41598-025-90948-7.

[16] Y. Y. Liang, M. Shahabuddin, S. F. Ahmed, J. X. Tan, and S. M. Ali, "Optimizing sustainable aviation fuel supply chains: challenges, mitigation strategies and modeling advances," *Fuel*, vol. 402, p. 135972, Dec. 2025, doi: 10.1016/j.fuel.2025.135972.

[17] R. Ahadzadeh, E. Dehghani, and P. Ghasemi, "Towards sustainable closed-loop photovoltaic supply chains: A hybrid framework integrating reinforcement learning and mathematical models," *Expert Syst. Appl.*, vol. 296, p. 129182, Jan. 2026, doi: 10.1016/j.eswa.2025.129182.

[18] R. Moorthy, B. Jain, and P. Gidde, "Autonomous Non-Intrusive Inspection for Risk Detection in Cargo Containers Using Deep Learning," in *Computer Vision and Image Processing*, vol. 2473, J. Kakarla, R. Balasubramanian, S. Murala, S. K. Vipparthi, and D. Gupta, Eds., in Communications in Computer and Information Science, vol. 2473. , Cham: Springer Nature Switzerland, 2026, pp. 220–233. doi: 10.1007/978-3-031-93688-3_16.

[19] C. Engle, J. Van Senten, Q. Fong, and M. Good, "Economic vulnerability and resilience of aquaculture supply chains in the U.S. Western region," *Aquaculture*, vol. 611, p. 743026, Jan. 2026, doi: 10.1016/j.aquaculture.2025.743026.

[20] A. Salehi, A. Babaei, and H. Hamidi, "AI-Driven Strategies for Supply Chain Resilience: A Review of Challenges and Solutions During Pandemics," *Int. J. Eng.*, vol. 39, no. 3, pp. 585–605, 2026, doi: 10.5829/ije.2026.39.03c.03.

[21] G. Chen, M. I. M. Wahab, and L. Fang, "Optimal periodic review order-up-to policy in a single-vendor multi-retailer cold chain with continuous multi-stage quality degradation," *Appl. Math. Model.*, vol. 149, p. 116323, Jan. 2026, doi: 10.1016/j.apm.2025.116323.

[22] S. Chaudhary, A. K. Saha, and M. K. Sharma, "A circular economy based nonlinear corrugated waste management system using Fermatean bipolar hesitant fuzzy logic," *Sci. Rep.*, vol. 15, no. 1, p. 7099, Feb. 2025, doi: 10.1038/s41598-025-90948-7.

O REVIZUIRE SISTEMATICĂ A LITERATURII DE SPECIALITATE PRIVIND MANAGEMENTUL LANȚULUI DE APROVIZIONARE ÎN LOGISTICA CIVILĂ: IMPLICAȚII TEHNOLOGICE ȘI VULNERABILITĂȚI

Rezumat: Această lucrare prezintă o analiză sistematică a literaturii de specialitate privind managementul lanțului de aprovizionare civil (SCM) din 2010 până în 2025, cu scopul de a surprinde evoluțiile cheie, lacunele de cercetare și direcțiile emergente. Folosind analiza bibliometrică a datelor Scopus procesate prin VOSviewer, au fost identificate cinci clustere tematice majore: sustenabilitate și lanțuri de aprovizionare verzi, transformare digitală (Industria 4.0/5.0), managementul riscului și reziliența, integrarea și performanța lanțului de aprovizionare și dimensiuni socio-economice, cum ar fi securitatea alimentară și logistica umanitară. Revizuirea a 30 de studii empirice cu impact ridicat evidențiază relevanța crescândă a practicilor sustenabile, echilibrul dintre eficiență și reziliență și influența transformatoare a blockchain-ului, big data și inteligenței artificiale. Constatările indică o schimbare de paradigmă în SCM, de la abordări centrate pe costuri la cadre multidimensionale care integrează obiective economice, de mediu, sociale și de reziliență. În ciuda progreselor semnificative în SCM verde și digitalizare, persistă lacune în ceea ce privește sustenabilitatea socială și integrarea rezilienței cu sustenabilitatea. Se așteaptă ca cercetările viitoare să proiecteze modele de lanț de aprovizionare reziliente, sustenabile și digitale, capabile să abordeze perturbările globale.

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