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Digitalisation On Automotive Supply Chain for Climate Competitiveness: A Systematic Bibliometric Analysis

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Abstract

The automotive industry, a cornerstone of global manufacturing, is undergoing a profound transformation driven by digitalization. This research paper explores the impact of digitalization on the automotive supply chain and its role in enhancing climate competitiveness. As the industry strives to meet stringent environmental standards and consumer demands for sustainability, leveraging digital technologies becomes imperative. We use R Studio software to perform bibliometric analysis in this study. Our initial repository for data came from the Scopus database. Following a keyword search and before applying the limited criteria, we were able to find 3202 papers. We then started integrating the limited criteria, which included the following: stream: Business Management & Accounting, source type: Journal, no author, duplicate titles, and language: English. After applying these criteria, we were able to find 935 papers. We selected citations, bibliographical data, abstracts and keywords, funding information, and other data before exporting our database from Scopus.

Keywords: *Supply Chain Digitalization, Climate Competitiveness, and Closed-Loop Supply Chain.*

INTRODUCTION

The global manufacturing sector depends on the automotive industry, which is fundamental to economic growth and social mobility (Ahmed et al., 2020). It is critical to acknowledge that the sector of interest is the basis of the contemporary world, being the cornerstone of progress and the instrument of employment (Bhatia et al., 2022). At the same time, the challenges related to environmental sustainability have become more significant in the last several years . Moreover, it is necessary to understand that the automotive industry presents massive injection in the gross domestic product of many countries. Similarly, employment generation in manufacturing, sales, services, and others has depended on the industry (Kumar & Yamaoka, 2006). Additionally, the industry has led the world in technological advancement, influencing the growth of engineering, materials science, and electronics (Zhou et al., 2023). Constant research and innovation have seen safety features improve, fuel consumption efficiency increase, and integration of some of the latest technologies (Parsaiyan et al., 2019).

The complexity of the automotive supply chain is that it covers the entire planet involved in the manufacturing and distribution process (Maheshwari et al., 2023). The global-scale nature of the supply chain results in a range of implications for international trade and economic integration. On the one hand, automobiles have reshaped citizens' lives, allowing people to have unique mobility patterns and lifestyles (Ma & Cheng, 2023). The interaction process between the automotive industry and external stakeholders has created a fertile ground for sustainability development (van Loon et al., 2018). Digitalization is one of the most transformative forces affecting all aspects of human life in Industry 4.0 and beyond (Aldrighetti et al., 2023). The past supply chain management landscape was characterized by linear and often siloed processes with limited real-time observation

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due to manual intervention (Zhou et al., 2023). As a result, traditional supply chains were riddled with delays, inefficiencies, and failure to respond adequately to consumers' requirements (Fargetta & Scrimali, 2023).

The definition of digitalization in supply chain management involves the efforts toward the complete integration of digital technologies across the entire value chain (Zhou et al., 2023). Considering the range of technologies applied within digitalization, this concept can be generally defined as integrating a spectrum of technologies, including IoT, AI, Blockchain, data analytics, and cloud computing, to mention a few (Valsamidis, 2020). These tools create a well-connected, intelligent supply and demand network. For example, the IoT sensors integrated into physical assets are used for tracking and monitoring in real-time terms of goods, inventories, or equipment (Aldrighetti et al., 2023). Advanced analytical tools process big data and provide valuable insights for decision-making (Rasool et al., 2023). Predictive analytics allows us to minimize risks and optimize efforts and expenditures throughout the entire supply chain (Seyedghorban et al., 2020).

LITERATURE REVIEW

(Taj et al., 2023), suggest that real-time monitoring of vehicles, components, and equipment through IoT technologies provides visibility and traceability in the supply chain. (Theissler et al., 2021) emphasis that the application of IoT for predictive maintenance that cuts downtime and improves operational performance across the board in the automotive manufacturing process. (Nti et al., 2022), performs a literature review that includes AI and machine learning algorithms in demand forecasting, production planning, and quality control. The solutions facilitate decision-making when placing and executing orders. Finally, (Bhattacharya et al., 2024) reveal AI's role in logistics optimization, cost cutting, and supply tracking.

Another perspective on Blockchain and the automotive supply chain is provided by (Ghomi-Avili et al., 2023), who cover the implications of Blockchain for secure and transparent transaction records, anti-fraud initiatives, and the safety of supply chain information. Additionally, it considers the potential of Blockchain to increase trust and reduce adversarial attitudes between partners for supply chain cooperation (De Giovanni, 2022). Another relevant reflection on this topic is provided by (Quariguasi Frota Neto & Dutordoir, 2020) regarding the personality of using data analytics for the automotive supply chain risk management, including disturbances and uncertainties. (Tavana et al., 2022) Understand the importance of data analytics in adjusting inventory levels in the automotive sector and the opportunity to improve order processing and reduce order completion intervals. Finally, (Fu et al., 2023) research the implications of electric vehicles for climate competitiveness and the reduction of carbon emissions by the automotive sector.

For instance, (Kalverkamp & Young, 2019) take a closer look at the corporate sustainability approach in the automobile industry and underline the importance of implementing environmental responsibility into businesses' strategies. Another good example is a research conducted by (Suhandi & Chen, 2023) that examines the adoption of sustainability practices and their effects on cars' impact on the climate and climate competitiveness of automotive companies.(Chiriac, 2011) outlines the best innovations in the automobile industry, which have significantly impacted companies' climate competitiveness. More specifically, they focus on technological breakthroughs as a critical factor. Finally, a paper by (Fahimnia et al., 2013) examines the relationship between sustainable supply chain practices and climate competitiveness in the automobile industry. Again, the focus is on environmental responsibility and its influence on competitiveness.

Research by (Sarkar et al., 2019)delves into strategies for reducing the carbon footprint in supply chains, highlighting the role of digital technologies in optimizing transportation, production, and distribution processes. (Yadav et al., 2024) examines how sustainable supply chain practices contribute to reducing greenhouse gas emissions and improving climate competitiveness. (Taj et al., 2023) explores the application of IoT for real-time monitoring of supply chain processes, enabling better visibility into environmental impacts and enhancing climate competitiveness.(Modares et al., 2023) Discuss IoT's use in tracking and optimizing transportation processes, reducing emissions, and promoting sustainable logistics.

(Chu et al., 2022) examines how blockchain technology enhances transparency and traceability in supply chains, contributing to sustainable sourcing and reducing environmental risks. (Yadav et al., 2024) emphasizes the role of Blockchain in creating a trustworthy and verifiable record of carbon emissions and sustainability practices.

(Hu & Bidanda, 2009) discusses the application of AI in predictive analytics for supply chain management, optimizing inventory levels, demand forecasting, and transportation planning to reduce carbon emissions. (Andryushchenko et al., 2020)explores how AI-driven algorithms enhance decision-making processes, leading to more sustainable and climate-competitive supply chain strategies. (Blouin & Audy, 2023)Explores the potential of circular economy principles in supply chains, emphasizing the role of digitalization in creating closed-loop systems for sustainable resource utilization.

METHODOLOGY

In this work, we do bibliometric analysis using R Studio software. We acquired our base data from the Scopus database, and our keywords were supply chain digitalization, climate competitiveness, and closed loop supply chain; after searching via keywords and before limited to criteria, we reached 3202 papers, and then we started to apply the limited criteria, such as (stream: Business Management & Accounting, source type: Journal, no author, duplicate titles, and language: English); after we applied those criteria, we reached 935 papers (Ahmad et al., 2023; Donthu et al., 2021; Gan et al., 2022; Kaurav & Gupta, 2022; Lim et al., 2022; Pandey et al., 2023; Valenzuela-Fernández & Escobar-Farfán, 2022). see Figure 1.

The Research Questions are

RQ1. What is the country's production over time & word cloud on digitalization in achieving climate competitiveness within the supply chain?

RQ2. Which are the most prolific authors, and what are the most relevant words and keyword co-occurrences in digitalization to achieve climate competitiveness within supply chains?

RQ3. What is the relationship between fundamental themes, authors, co-authors, countries, and sources in digitalization and achieving climate competitiveness within the supply chain?

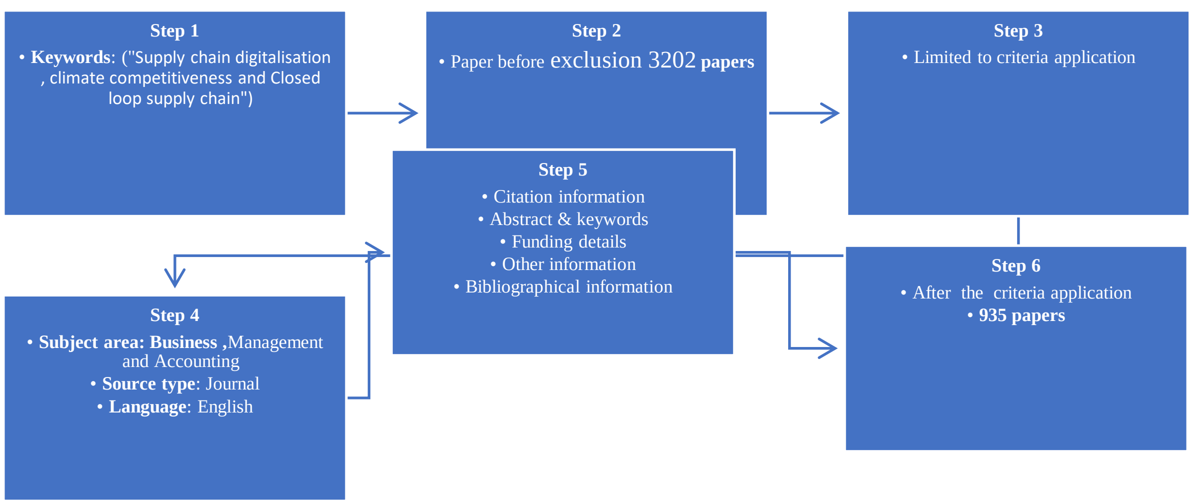

Figure 1: Limiting criteria process

RESULTS & DISCUSSIONS

Main Information

Figure 2: Main Information

The provided data contains information about a research dataset spanning from 2001 to 2024, sourced from 152 different publications (journals, books, etc.). The dataset comprises 935 documents with an annual growth rate of 12.5%. The average age of the documents is 6.07 years, and each document receives an average of 54.68 citations. The dataset references a total of 38,984 sources. In terms of document contents, there are 2,817 Keywords Plus (ID) and 2,173 Author's Keywords (DE). The dataset involves 1,896 authors, with 52 single-authored documents. Authors collaborated in creating 58 single-authored documents, with an average of 3.12 co-authors per document. International co-authorships contribute to 34.65% of collaborations. Regarding document types, the dataset comprises 876 articles, 7 conference papers, 5 editorials, 2 typos, and 45 reviews.

This dataset presents a comprehensive collection of scholarly works with diverse document types, significant international collaboration, and a notable number of citations per document, suggesting its relevance and impact in the academic domain. The data reflects a dynamic and growing body of literature over the specified timespan.

Most Relevant Words

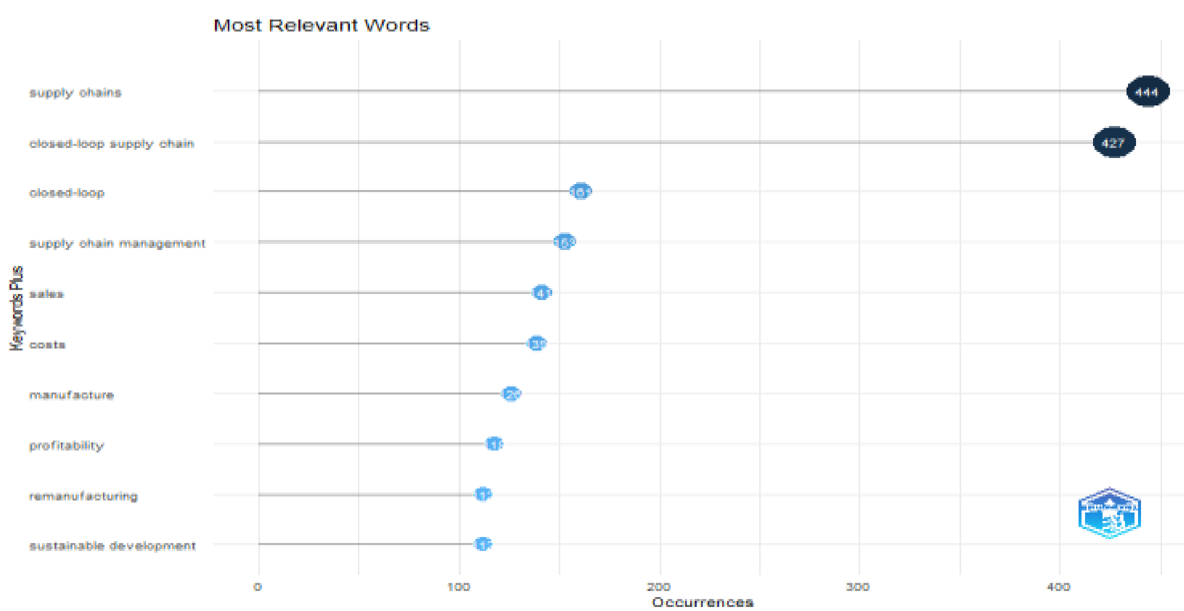

Figure 3: Most Relevant Words

The provided word frequency data reveals the prevalence of various terms in the field of supply chain management, mainly focusing on closed-loop supply chains, sustainability, and decision-making processes. The most mentioned words are "supply chains" and "closed-loop supply chain," with 444 and 427 appearances, respectively. As such, this shows significant attention to the entire process of supply chains, with the close supply chain loop synonym highly used as a pointer to an increased interest in sustainable and circular supply chain practices. Sales, costs, and profitability are frequent, indicating a highly pronounced business focus in supply chain use. In addition, the terms remanufacturing, recycling, and sustainable development are used frequently, showing interest in environmental awareness and being a pointer to the growing global environmentalism trend. Linear matrix inequalities, integer programming, and game theory are the only ones used, showing extensive use of advanced supply chain methods and decision-making use.

In addition, several specific concepts, such as "carbon," "circular economy," and "environmental impact," indicate the particular attention that has been paid to issues of environmental sustainability. At the same time, "life cycle," "competition," and "economic and social effects" highlight the multidimensionality of supply chain activities bounder in their social and economic impacts on different aspects of the economy and social life. The abundance of such terms as "logistics," "product design," and "inventory control" implies a comprehensive approach to the supply chain that involves all of the aspects mentioned above. To conclude, word frequency analysis demonstrates the intricate nature of word research in the modern supply chain domain. The prevalence of terms associated with sustainability, decision, economy, and environmental considerations reveals a complex and multidisciplinary approach to understanding and improving supply chain processes. Researchers and practitioners are actively involved in examining innovative strategies, analytical approaches, and sustainable practices to optimize supply chain performance and address economic and environmental challenges.

Word Cloud

Figure 4: Word Cloud

The frequency data offers a complete picture of the most common themes and topics in the discipline of supply chain management. First, the term "supply chains" occurs 444 times, emphasizing the significance and wide scope of the industry-designed processes, challenges, and innovations. This broad categorization likely encompasses a wide range of topics, including logistics, inventory management, and distribution strategies, showcasing the holistic approach researchers and practitioners take to understand and optimize the end-to-end supply chain.

A notable emphasis on sustainability is evident through the high frequency of terms related to closed-loop supply chains, with 427 occurrences. This underscores the growing significance of environmentally conscious practices in supply chain management. The emphasis on closed-loop systems, recycling, and remanufacturing reflects a concerted effort within the academic community to explore and implement eco-friendly approaches, aligning with global initiatives for sustainable development. The frequent appearances of other terms, such as "sustainable development," "recycling," and "circular economy," showcase the consistent effort of researchers to align supply chains with the principles of protecting the environment.

Furthermore, the data highlights the complexity of decision-making processes involved in supply chain management. The word' decision making' are used 87 times, which shows the unique frames of understanding and the need to optimize decision making. The latter can encompass strategic activities related to supply chain construction, operational elements of inventory management, and tactical decisions to be made about suppliers. Thus, the versatility of decision-making is explained by the need to use data as the basis for effective choice and maintain efficiency and responsiveness under various market conditions. The words' linear matrix inequalities, 'integer programming,' and 'game theory' demonstrate the relationship between technology and supply chain management. Ultimately, the search results show the latter as an area that requires technology and intelligent systems integration to support mathematical models and computational tools to solve significant problems.

Further supplementing the focus on the quantitative side of supply chain management described before, the data starts to manifest a preoccupation with these processes' economic and social dimensions. Namely, certain phrases like "economic and social effects" and "commerce" that occur with frequencies of 29 and 69, respectively, reflect the acknowledgment that this aspect should be taken into account. What these results convey is that researchers aim to consider not only the optimal operations but also the repercussions of implementing these decisions on the broader society and economy, which nurtures a comprehensive approach to the discipline.

Country Production Over Time

The dataset provided displays the annual count of articles published in scholarly journals for the four countries USA, China, United Kingdom, and India from 2001 to 2024. When observing the trends for United States, it can be seen that this country always maintains a leading position for article production within this period. In 2003, only 6 articles were published in academic journal, while in 2024, USA published 322 articles. Such a steady increase indicates a long-term and considerable share contribution to academic literature. This could be explained by USA's developed research infrastructure and active scientific environment across various study fields.

Another vital contributor is China, showing a substantial increase in research output . China features minimal publications at the beginning of the revealed dataset period, but publication growth is remarkable, reaching 783 articles by 2024 . Given the growth, China's increasing investment in research and development, developing influence in global academia, and article contribution to the identified issue are becoming more evident. The United Kingdom and India are in comparatively close research output proximity, with both countries experiencing progressive growth. The UK demonstrates growth from 3 publications in 2005 to 130 contributions in 2024, showcasing linear progression. India's growth, on the other side, is more intensive, with a publication count reaching almost 300 contributions, starting from just several articles in 2009. It is particularly interesting to evaluate that similar trends differ in terms of absolute values, indicating growing research productivity in India specifically. Thus, all four countries provide meaningful insights into research publication dynamics in the field.

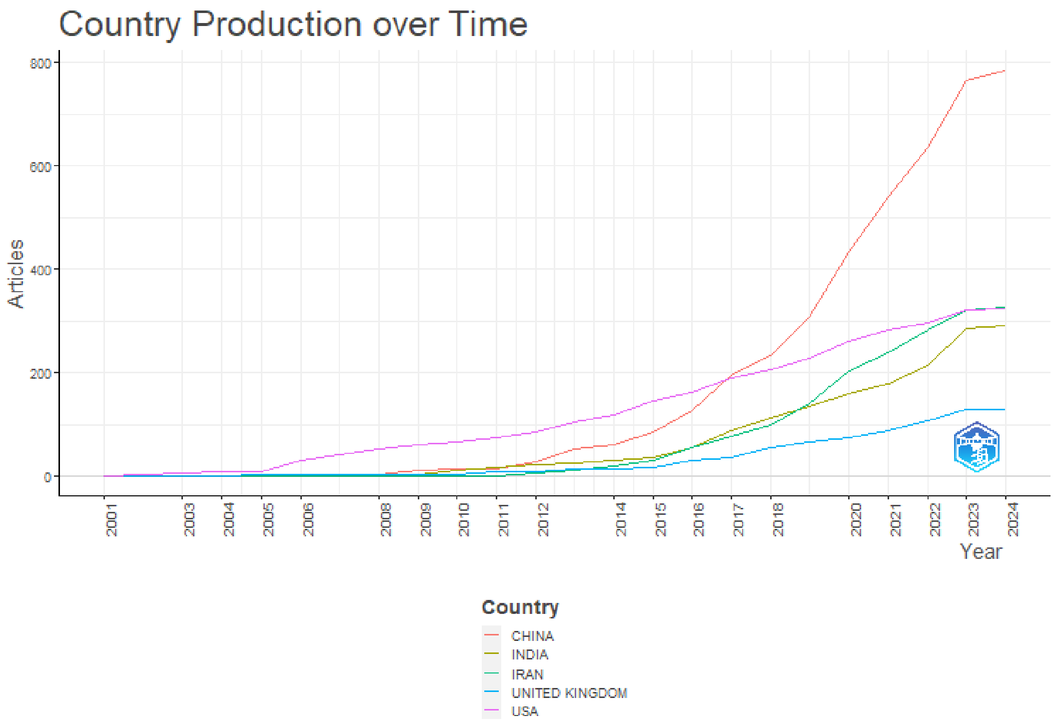

Figure 5: Country Production Over Time

The dataset shows that Iran presents a separate pattern in terms of research article production. Its publication frequency grows from 6 in 2012 to 325 in 2024. Although the figure is much lower compared to the US and China, the increasing rate can also be indicative of the rising interest in Iranian scholars and cooperation with the international academic community. This trend corresponds to Iran's emphasis on developing its scientific and research potential, which becomes possible due to significant investment in higher education and research institutions.

Most Relevant Authors

The presented data provides valuable information regarding the authors' productivity and contribution to the field, enlightening on their influence output. Several standout authors had a high number of articles published, with Govindan K, Van Wassenhove LN, and Wang Y being among those, suggesting their great influence over the domain. Govindan K, for example, although authoring the most papers, has a high fractionalized count, indicating a great variety of topics and collaborations, showcasing a comprehensive research portfolio. In contrast, authors such as Souza GC and Guide VDR, while having a respective number of fractionalized counts, exhibit a more focused research impact on fewer topics within the domain.

The analysis of authorship data offers valuable contributions to how supply chain management research is characterized as a collaborative endeavor. This arises from measuring and comparing the total and fractured article counts to understand the tendencies toward specialization, collaboration, or the progression of authors' contributions to this area's expanding knowledge base.

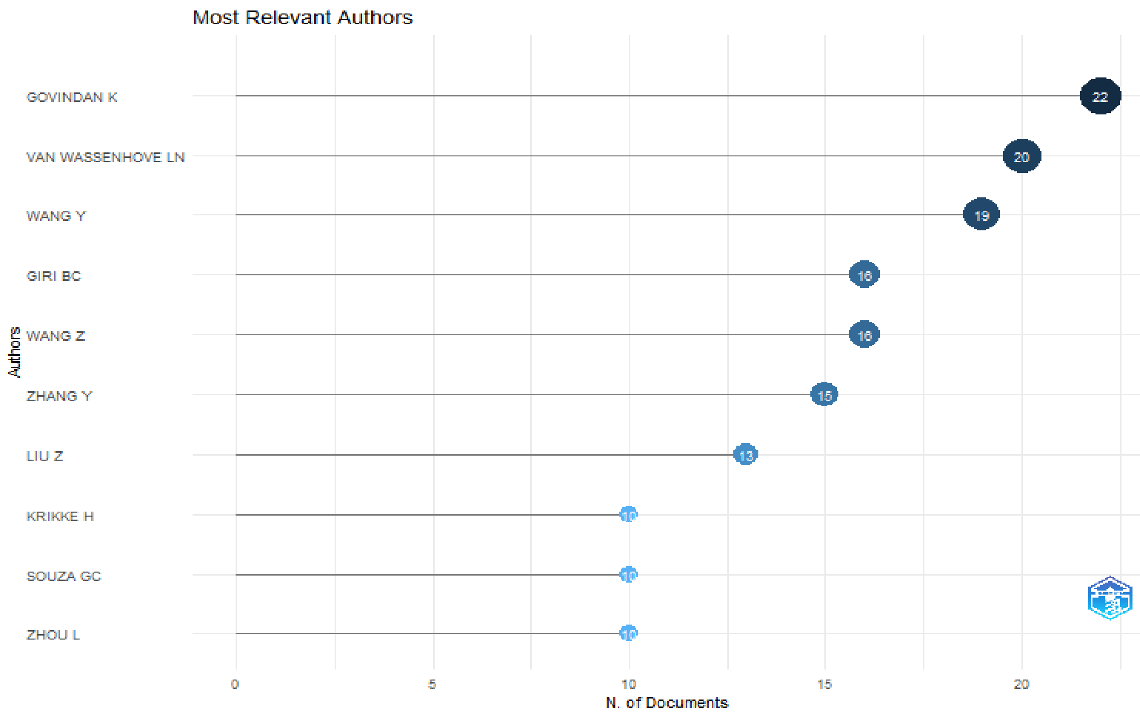

Figure 6 : Most Relevant Authors

Cluster Analysis

The data given represents a network analysis of two clusters related to supply chain management. As can be seen from Cluster 1, the nodes like "supply chains," "closed-loop supply chain," and "sustainable development" have a high betweenness centrality value. This means that the nodes play an important role as bridges, helping the other nodes in the cluster connect with one another in a more effective way.

Furthermore, the high closeness centrality of these nodes exposes that "supply chains" and "closed-loop supply chains" are closely located to other nodes in Cluster 1. In other words, these concepts are highly related to many other topics forming Cluster 1 and thus are essential for the general understanding of supply chain management as a whole. As for PageRank, "supply chains" and "closed-loop supply chains " are influential nodes. Essentially, PageRank estimates the importance of nodes in the network based on the number of incoming links. Therefore, the high PageRank values of these nodes suggest that "supply chains" and "closed-loop supply chains" are highly impactful and authoritative. In Cluster 1, "sensitivity analysis," "logistics," and "circular economy" are also significant nodes, influencing the general structure of the network and dissemination of knowledge within the cluster.

As for Cluster 2, the nodes "supply chain management," "sales," and "costs" have high betweenness centrality. These nodes form a bridge between the different parts of the network and act as intermediaries. High betweenness values in Cluster 2 nodes mean that these concepts are crucial for the knowledge flow in the cluster. It is also noted that "manufacture" and "profitability," along with "remanufacturing," have closeness centrality, connecting them with nearly every node in the cluster. Thus, these concepts are the closest to relationships in Cluster 2. The PageRank method shows that nodes "sales," "costs," "linear matrix inequalities," "game theory," and "recycling" have great influence and a high position of authority. "Linear matrix inequalities" and "game theory" influence the knowledge circulation the most in Cluster 2.

Table 1 : Cluster Analysis

Node	Cluster	Betweenness	Closeness	PageRank
supply chains	1	126.420553	0.02040816	0.10287851
closed-loop supply chain	1	97.3679673	0.02040816	0.09834677
closed-loop	1	16.9943181	0.02	0.04103537
sustainable development	1	7.39798196	0.01923077	0.02903694
decision making	1	4.61607708	0.01923077	0.02476304
integer programming	1	4.65184543	0.01724138	0.0234621
closed-loop supply chains (clsc)	1	2.82390662	0.01785714	0.01918258
reverse logistics	1	1.13483989	0.01587302	0.01698523
sensitivity analysis	1	3.84407746	0.01886792	0.02065653
product design	1	1.98219594	0.01785714	0.01640791
logistics	1	1.24858063	0.01612903	0.01495293
circular economy	1	0.64221637	0.01538462	0.01289418
optimization	1	1.50901361	0.01724138	0.01335631
stochastic systems	1	1.14324704	0.01666667	0.01536714
environmental impact	1	1.22440537	0.01754386	0.01308015
life cycle	1	0.17101567	0.01428571	0.00982429
closed-loop supply chain networks	1	0.61584912	0.01538462	0.0122002
economic and social effects	1	0.34183115	0.01492537	0.01023241
inventory control	1	0.12892799	0.01408451	0.00940425
sustainable supply chains	1	0.18981947	0.01449275	0.00906746
multiobjective optimization	1	0.33188385	0.01449275	0.00970256
closed-loop supply chain network designs	1	0.36502526	0.01428571	0.00891575
nonlinear programming	1	0.41426446	0.01538462	0.01002112
uncertainty analysis	1	0.30151494	0.01428571	0.00888898
stochastic models	1	0.30702919	0.01515152	0.01006989
genetic algorithms	1	0.08814426	0.01388889	0.00760682
recovery	1	0.02420305	0.01333333	0.00726802
green supply chain	1	0.13980865	0.01351351	0.00688864
supply chain management	2	11.0337105	0.02040816	0.03193859
sales	2	10.8967765	0.02040816	0.03976488
costs	2	8.2751195	0.01960784	0.03801648
manufacture	2	5.13133611	0.01886792	0.03334767
profitability	2	5.52973485	0.01886792	0.03188013
remanufacturing	2	5.58730073	0.01851852	0.0312571
recycling	2	3.96933832	0.01785714	0.02615856
linear matrix inequalities	2	5.19067123	0.01960784	0.02900021
game theory	2	1.75797315	0.01587302	0.02152871
commerce	2	2.65707245	0.01724138	0.02104758
remanufactured products	2	0.55647649	0.01612903	0.01531098
competition	2	0.37352014	0.01470588	0.01056404
carbon	2	0.74697222	0.01639344	0.01183788
environmental management	2	0.15054752	0.01428571	0.0091967
original equipment manufacturers	2	0.13023355	0.01428571	0.00934832

emission control	2	0.16029458	0.01470588	0.00953944
environmental regulations	2	0.16701618	0.01470588	0.00876926
manufacturing	2	0.09609204	0.01315789	0.00801247
reverse supply chains	2	0.03433132	0.01315789	0.00723001
stackelberg games	2	0.03432146	0.01298701	0.00852846
third parties	2	0.03513096	0.01282051	0.0080176
cost effectiveness	2	0.0654876	0.01351351	0.00720882

Figure 7: Cluster Analysis

Concluding, the network analysis allows obtaining meaningful information about two clusters in supply chain management. This information includes the critical subsets, significant subjects, also the connections between them, and the role in the knowledge dissemination and collaboration activities of the cluster members.

KEYWORD CO-OCCURRENCES

Two clusters, which are "supply chains" and "sales," were analyzed with the set of centrality and density measures. In the case of Callon Centrality, the value for "supply chains" is 6.71 and 6.27 for "sales." It means that the "supply chains" factor is more important in the network where it is placed. Finally, it is possible to analyze the Callon Density. The presented metric reflects the density of connections inside the cluster. In this case, "supply chains" have 29.69 Callon Density, while "sales" is presented with 25.90. Such results prove a more integrated and coherent network for "supply chains" compared to "sales."

Moreover, "supply chains" take the second place according to Rank Centrality and Rank Density. In contrast, "sales" statistics are reaching the top Ranks for both metrics, showing a more central and fundamental role. However, the Cluster Frequency also shows that "supply chains" appear 3494 times compared to 1766 for "sales." Thus, looking at the centrality and density metrics, it is possible to say that different structures and roles are identified. The high centrality, density, and frequency in "supply chains" show the essentials and tightly connected network. At the same time, "sales" show top centrality and density results that prove their central and high statuses, as well as global frequency metrics in the dataset.

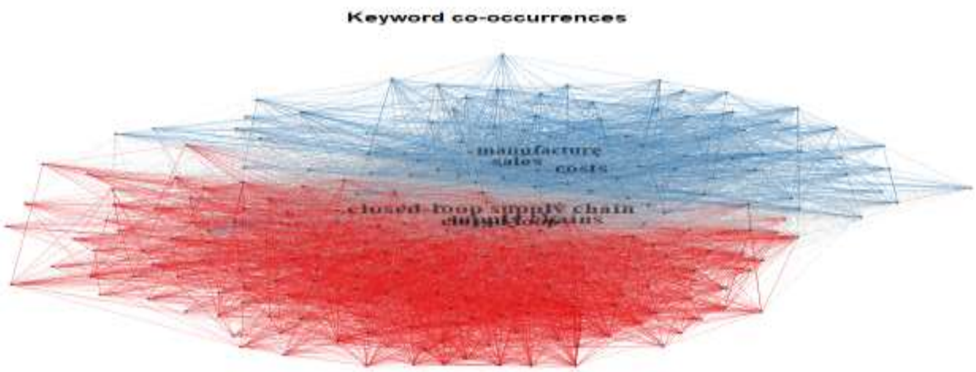

Figure 8 : Keyword Co-Occurrences

Coupling Network

The presented data describes several groups, which are defined by topics and their percentage of participation in conferences, collection frequencies, and the calculated indices. The first group with 50 frequency is identified by a high centrality value 0.467 coefficient, which shows a close connection within "supply chain management," "sustainable supply chains," and "sustainable development" topics. The high impact value 1 of color code #E41A1C80 demonstrates the specialty of this group.

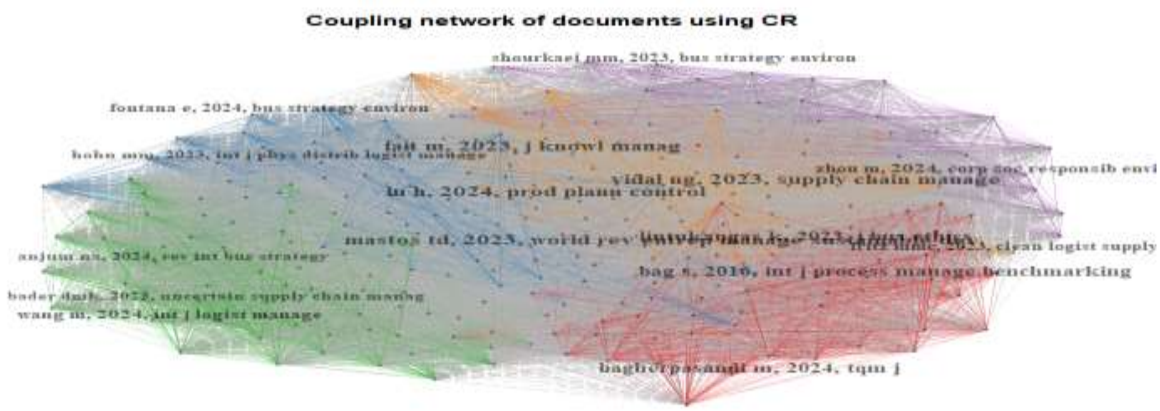

Figure 9: Coupling Network

Group 2 has a frequency of 56 and a centrality value 0.368, slightly weaker than Group 1. Nonetheless, the observed topics present a strong level of centrality. "Supply chain management" clearly relates to "sustainable development" and "sustainable supply chains," thus exposing a pronounced centrality. Moreover, the impact value of 1 reflects the notable influence of these topics. In addition, Group 2 is characterized by the color code #377EB880, underlining its distinctiveness.

To sum up, due to the analysis of these labeled groups, it was revealed that these topics – "supply chain management," "sustainable supply chains," and "sustainable development" – always emerge as highly connected and influential clusters. These groups are signified by the color codes, highlighting their distinctive features. For example, Group 1, which demonstrates both high frequency and centrality metrics, appears to be the most influential. At the same time, other groups may show the difference in these metrics but still contribute to the network in their manner.

CONCLUSION

The literature reviewed extensively has several key findings, as outlined, indicating that digitalization is the core concept in maintaining climate competitiveness in the supply chains. First, digitalization involves IoT, Blockchain, artificial intelligence, and data analytics, which is critical to converting traditional to sustainable and climate-competent networks. Secondly, the application of IoT and Blockchain technologies improves real-time connectivity, visibility, and transparency throughout the supply chain. This results in environmental benefits while fostering trust and responsibility among stakeholders.

As can be seen, Artificial Intelligence facilitates data-driven decision-making in supply chains based on predictive analytics. Therefore, it helps to eliminate waste, reduces the need for adjusting demands and supply, which have a positive impact on the carbon competitiveness factor. In turn, Blockchain is presented as a reliable technology in sustainable sourcing and traceability, as it eliminates the chance of forgery and provides an unchangeable source of information. As a result, the detailed record of sustainability practices helps address the concept of climate competitiveness – reducing organizations' harm to the environment while increasing their viability. Moreover, data analytics processes related to the identified factors are essential because they indicate where and how organizations are sustainable. Lastly, new digitalizing opportunities pose challenges such as the readiness for digital transformation, interoperability issues, and lack of collaborative networks. Therefore, organizations must be prepared to face these and other potential challenges.

Among the other human-centric considerations, organizational readiness and the involvement of individuals in the technology adoption process are critical for success. Human roles are neglected factors in integrating digitalization with sustainable supply chain practices, and it is essential to consider some future directions. Specifically, it is valuable to incorporate circular economy principles with digital utilization to develop closed-loop supply chain units. This will secure economies of sustainable resource utilization and correspond to the goals of competitiveness in a heated climate. The aspect of strategic organizational approaches is also discussed, and there is an essential focus on linking digitalization to broader sustainability initiatives. Organizations handling the issue interactively with the motive leading are more effectively pre-disposed to stay competitive with the climate. The ethical concerns are also determinant, uniquely in data protection and passionate backing. It is a severe problem that is essential to the proper correlation among the supply chain units. Trust's role between supply chain participants and other included parties is vital for successful digital endeavors, and ethical behaviors are instrumental in forming and maintaining this trust.

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