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Time Ahead Inclinations in Sustainable Supply Chain Management using Artificial Intelligence: A Bibliometric Approach

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Abstract

Sustainable Supply Chain Management [SSCM] focuses on integrating environmentally sustainable practices into supply chains to balance economic growth with environmental care and social responsibility. The adoption of Artificial Intelligence [AI] in SSCM is revolutionizing supply chain operations by offering new opportunities for efficiency, transparency, and sustainability. The research paper is basically done to find out the field's trends and current research status. Further, the aim of the research is to derive the major concepts and social collaboration on study. The study highlights the emergence of block chain technology as a significant area of interest within SSCM and AI, alongside the importance of green supply chain practices and big data utilization for enhancing sustainability and management practices. The paper underscores the potential of AI-driven technologies, such as predictive analytics and machine learning, to improve supply chain management by enhancing decision-making accuracy, reducing inefficiencies, and promoting sustainable practices. The most used terms in the research are Artificial Intelligence, Supply Chain, Decision Support Systems, Decision Making, and performance. The paper explores three main themes; these include the emergence of block chain technology, the interplay between AI and green supply chain practices, and the significance of management practices alongside big data and sustainability considerations. This thematic analysis suggests areas with potential for further research and development. This paper underscores the critical role of AI in advancing sustainable supply chain practices and outlines the current state of research, key contributors, and future directions in this interdisciplinary field.

Keywords: Artificial Intelligence, Big Data, Block chain Technology, Sustainable Supply Chain Management.

Introduction

A sustainable supply chain incorporates environmentally sustainable practices and robust strategies to reduce environmental consequences while upholding efficiency and profitability (1). Here, Sustainable supply chain management [SSCM] encompasses the meticulous coordination and administration of supply chain processes, emphasizing the principles of environmental, social, and economic sustainability. This entails the minimization of waste, the conservation of resources, the advancement of ethical sourcing practices, and the safeguarding of the welfare of workers throughout the entirety of the supply chain. SSCM has emerged as a crucial focal point for organizations striving to harmonize economic advancement with environmental stewardship and societal accountability. The incorporation of AI in SSCM is transforming the operational dynamics of supply chains, presenting unparalleled prospects for effectiveness, openness, and sustainability. AI innovations, such as predictive analytics, machine learning, and intelligent automation, amplify demand projection accuracy, streamline resource utilization, and diminish inefficiencies, thereby fostering sustainable methodologies throughout the supply chain (2). AI and digitalization enhance accountability and sustainable performance, in accordance with the UN 2030 Agenda, through the promotion of resilient business models and the improvement of knowledge management within supply chains (3). AI has the capability to greatly improve the effectiveness of supply chain management through the automation and optimization of different processes, resulting in a decrease in human error and a higher level of precision and speed in

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decision-making. The integration of AI within supply chain management has the potential to enhance risk management by substituting subjective expert opinions with impartial, data-centric perspectives, consequently reducing biases and inefficiencies (4). The incorporation of AI in conjunction with block chain technology has the capability to enhance security, productivity, and auditability, thus reinforcing the resilience and cost-efficiency of supply chains (5). Big data analytics enables companies to enhance decision-making through the analysis of vast amounts of data to uncover patterns and insights. This can result in more streamlined and environmentally conscious supply chain operations. By utilizing big data, companies can effectively oversee their resources, minimizing waste and energy usage, thereby promoting a more sustainable supply chain (6). AI-driven technologies, like Artificial Intelligence of Things [AIoT], utilize data sensors and Radio-Frequency Identification [RFID] technology to offer real-time monitoring and notifications, essential for enhancing decision-making processes and operational effectiveness (7). The Technology Acceptance Model gives an important theoretical viewpoint for elaborating the intricate relationships between SSCM and AI, stressing the significance of perceived benefits and usability in technology acceptance. The integration of AI within supply chain management transcends mere technical implementation; it also embodies a social phenomenon that is shaped by human interpretation and cognitive sense making, as delineated in the AI Integration framework (8). The deployment of AI alongside other emergent technologies, including block chain and Industry 4.0 analytics, is imperative for augmenting the sustainability and resilience of supply chains, particularly in volatile contexts such as those encountered during the COVID-19 pandemic (9). Sustainable SCM promotes the embrace of digital technologies, which subsequently bolsters operational competitiveness, as corroborated by comparative studies conducted in South Korea and Vietnam (10). Additionally, there exists a profound interconnection between digitalization and sustainability, with sustainable decision-making processes serving a pivotal function in the attainment of sustainable development objectives (11). Within the medical devices sector, a hybrid algorithmic methodology has been formulated to optimize a sustainable supply chain network, thereby illustrating the efficacy of merging digital technologies with sustainability initiatives (12). In summary, the incorporation of AI into SSCM constitutes a complex process that necessitates a comprehensive examination of both technological and human dimensions to realize sustainable and competitive supply chains. The realization of SSCM highlights numerous challenges that warrant attention. These challenges entail embedding sustainability in the corporate vision, incorporating it across all functions, engaging in organizational learning with external stakeholders such as suppliers, defining socioecological sustainability among stakeholders, offering procedural support for strategic planning, and managing tradeoffs and economic considerations among stakeholders (13). Furthermore, the effects of occurrences like the COVID-19 pandemic can result in sustainability challenges within supply chains, including escalating costs, lack of transparency, price fluctuations, and misinformation, necessitating strategic policies and guidelines for recovery (14). In addition, the formation of a sustainable supply chain network calls for the decrease of expenses, control of environmental impact, and advancement of workforce efficiency, prompting the consideration of economic, environmental, and social elements, together with the construction of effective optimization algorithms (15, 16). Finally, integrating the psychological aspects of decision-makers into sustainable supplier selection and order allocation processes is vital for aligning decisions with real circumstances and achieving the triple bottom line of economic, environmental, and social factors (17). AI implementation among small and medium-sized businesses promotes a culture driven by data, enhances employee capabilities, and has a positive impact on sustainable practices and supply chain resilience (18). The incorporation of AI into supply chain management goes beyond just technical aspects; it is also a social process shaped by human understanding and interpretation, underscoring the importance of interdisciplinary teamwork and sociotechnical viewpoints to effectively leverage its transformative potential (4). Additionally, integrating AI methodologies into construction supply chains improves efficiency, reduces environmental footprint, mitigates risks, and enhances competitiveness (19). The fusion of Artificial Intelligence (AI) with sustainable supply chain management (SSCM) presents a layered effort that confronts an array of obstacles and openings throughout different fields. AI assumes a vital position in the enhancement of sustainable production by facilitating improvements in predictive maintenance, production planning, and customer relations, as underscored within the framework of Industry 5.0 (20). The implementation of AI-integrated technologies within SSCM is essential for addressing both environmental and economic challenges; however, a technological disparity persists regarding the resolution of social issues, including working conditions (21). In the United States, AI is strategically employed to augment operational efficiency and promote environmental advancements, such as the optimization of renewable energy utilization and the reduction of emissions, while concurrently supporting workplace safety and community initiatives (22). The application of AI in supply chain management (SCM) is shaped by technology trends, organizational systems, ecological factors, and human interactions, wherein AI aids in better decision-making, operational advancements, and sustainable solutions (23). Additionally, explorative AI capabilities bolster supply chain resilience, while exploitative AI capabilities enhance efficiency but may adversely affect resilience, thereby emphasizing the necessity of balancing these capabilities (24). In summation, AI functions as a catalyst for the promotion of sustainable practices within supply chains, providing a framework for strategic integration that can inform policy development and managerial decision-making aimed at optimizing supply chain efficiency, sustainability, and resilience across various industries and regions. The research aims to explore the current trajectory of publications that focus on the connection between SSCM and AI. Specifically, it seeks to identify the significant publishing outlets and academic journals that emphasize the subject of SSCM and AI, offering a comprehensive understanding of where key research in this field is being disseminated. The study also investigates the most impactful authors, countries, and institutional affiliations contributing to the development of knowledge in SSCM and AI. By identifying the significant authors, countries, and institutions that have the greatest influence in this domain, the research provides insights into the global landscape of SSCM and AI research. Additionally, it explores the primary subject areas most frequently addressed at the intersection of SSCM and AI, offering a thematic overview of the topics that dominate scholarly discourse. Finally, the research delves into the knowledge structures related to SSCM and AI, aiming to map out the intellectual frameworks and theoretical foundations that shape this emerging field. This exploration will provide a holistic view of the connections and trends within the literature on SSCM and AI, contributing to a deeper understanding of its evolution and future directions

Methodology

The current study follows bibliometric analysis to present a thorough, data-oriented methodology for comprehending the dynamic environment of SSCM through the utilization of AI. In contrast to alternative types of studies, it offers a macro-level synopsis of the most impactful publications, authors, and trends, thereby enabling scholars to discern pivotal research focal points and prospective directions. Its objective and quantitative characteristics ensure a reduction in bias when contrasted with conventional literature reviews, while effectively delineating intellectual frameworks and collaboration networks. Furthermore, bibliometric analysis adeptly handles substantial quantities of data, yielding a comprehensive perspective and bolstering evidence-based decision-making for researchers' intent on investigating emergent trends and research deficiencies within SSCM and AI.

Data Collection

Bibliometric data for the research is collected from the Scopus database and Web of science [WoS] database. For data collection, the PRISMA [Preferred Reporting Items for Systematic Reviews and Meta-Analyses] method is applied. This is a methodological framework designed to enhance the transparency and reproducibility of systematic reviews and meta-analyses. It is particularly relevant for bibliometric data collection as it provides a structured approach to literature searches, ensuring comprehensive and unbiased data gathering. The PRISMA method involves a detailed checklist and flowchart that guide researchers through the process of identifying, screening, and including studies in their reviews, thereby minimizing the risk of bias and enhancing the reliability of the findings (Figure 1) (25). The authors precisely determine the search term used to collect bibliometric data, ensuring it aligns with the subject matter and study's scope (26, 27). Various permutations of the search term were employed on both the Scopus and Web of Science databases for the purpose of independently collecting data. Subsequently, All the gathered data were merged, and any duplicate entries were eliminated (Table 1).

Table 1: Data Collection Method

Scopus		Web of Science	
Search Key	**Number of Documents**	**Search Key**	**Number of Documents**
Sustainable Supply chain and Artificial Intelligence	49	Sustainable Supply chain and Artificial Intelligence	22
Sustainable Supply chain and AI	17	Sustainable Supply chain and AI	13
Green Supply chain and Artificial Intelligence	30	Green Supply chain and Artificial Intelligence	24
Green Supply chain and AI	14	Green Supply chain and AI	10
Total	110	Total	69
Duplicates	-28	Duplicates	-19
Final Scopus Data	82	Final WoS Data	50
Final Merge Data			132
Duplicate			-39
Final Data			93
Not eligible for analysis			-3
Included for the data analysis			90

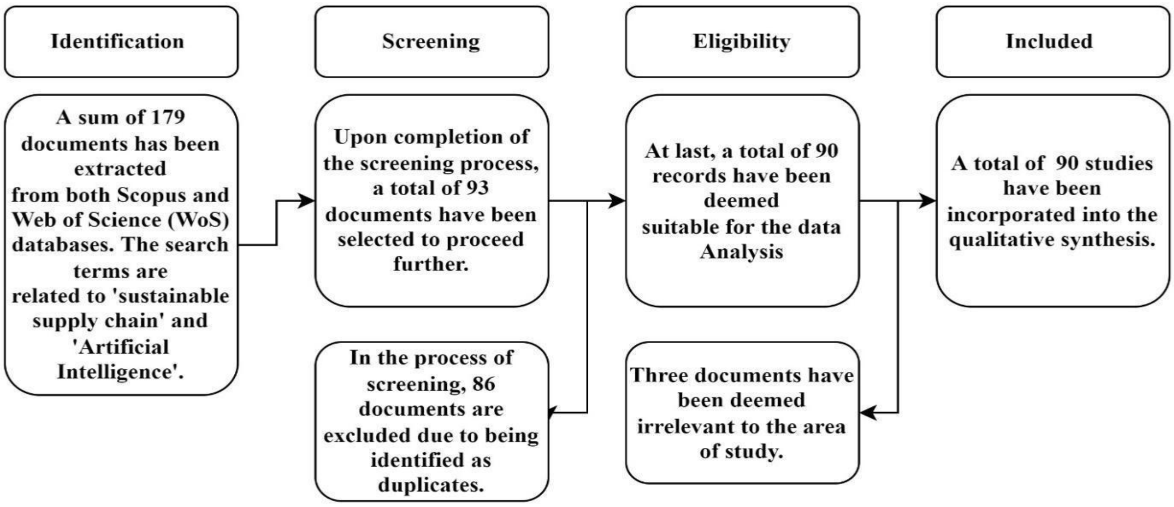

Figure 1: PRISMA Framework

A total of 179 documents have been extracted from the Scopus and WoS databases. Various sets of search terms pertaining to 'sustainable supply chain' and 'Artificial Intelligence' were utilized. Following the screening process, 93 documents were deemed suitable for further analysis, while 86 papers were excluded due to duplication. Finally, a sum of 90 records has been considered appropriate for the data analysis. Three documents deemed irrelevant to the study area have been excluded.

Data Analysis

In order to determine the answer to the formulated research question, a bibliometric descriptive analysis is employed. This analysis entails the depiction of data related to yearly scientific output trends, citation trends, the predominant journals in terms of h, g, and m Index. Additionally, it covers the primary affiliations involved and the commonly utilized terminologies within the present subject area. To synthesize knowledge structure of the bibliometric analysis the conceptual structure and social structure analysis is done. In the conceptual structure thematic map is used to find out the emerging or declining theme, Niche themes, Basic themes and motor themes about the subject matters. In the conceptual structure, again, factorial analysis is done with a Multiple correspondence analysis approach [MCA]. Here, the MCA technique has also been applied in the study of art and literature, where it helps visualize conceptual spaces and interpret the use of information technology by literary authors, reinforcing qualitative findings and providing deeper insights into the conceptual context of technology use. Again, MCA is a statistical methodology used for exploring and illustrating the relationships among various categorical variables (28). Finally, through the social structure the author's collaboration beyond the countries analyzed. The bibliometric data analysis is done with the bibliometrix package of the R-language (29).

Results and Discussion

Data Description

The bibliometric data description (Table 2) shows that the topic of sustainable supply chain and AI newest to the academic research domain as in the current research no document found prior to 2014. There were only 56 journal sources contributing to the research domain with 90 research articles. The annual growth rate of research on the current topic is 25.89 %, which shows that there is enormous scope for academic research. Again, this claim is more justifying when we consider the document's average age is 2.48 and the average citation is 24.07. The research can also justify that it has a broad area of application, as 337 authors' keywords found. A total of 291 authors have contributed to SSCM and AI, with 11 documents being authored by a single individual. On average, 3.64 co-authors are found per document, and internal co-authorships are seen in 23.33% of the documents.

Table 2: Bibliometric Data Description

Description	Results
Main Information about Data	
Timespan	2014:2024
Sources [Journals]	56
Documents	90
Annual Growth Rate %	25.89
Document Average Age	2.48
Average citations per doc	24.07
References	6443
Document Contents	
Keywords Plus	524
Author's Keywords	337
Authors	
Authors	291
Authors of single-authored docs	11
Authors Collaboration	
Single-authored docs	11
Co-Authors per Doc	3.64
International co-authorships %	23.33

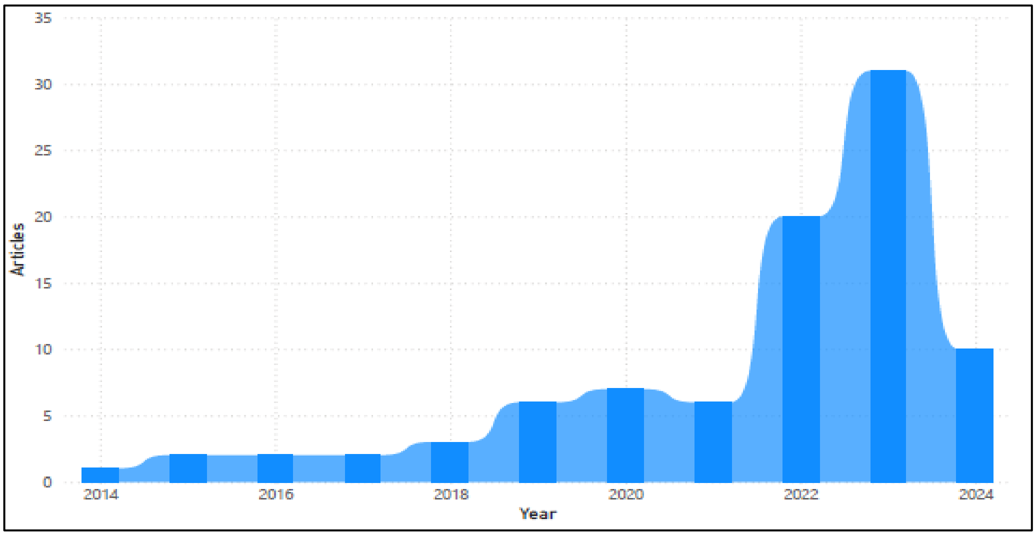

Figure 2: Annual Total Production per Year

Annual Scientific Production

The data presented in Figure 2 illustrates a notable increase in the number of publications since 2014. This indicates a growing interest among researchers in the subject and suggests promising prospects for the scope of the subject matter in the future. The statistics shown in Table 3 suggest that the distinctive count of citations per article and the typical count of citations per year do not manifest a distinguishable pattern. There is proof to indicate that 2018 witnessed the peak number of citations per article and per year, despite a sudden decline in the number of references per article and per year the following year. Moreover, with a mounting trend in the number of publications over the years, this could imply a potentially bright outlook for the future of research in this specific field.

Table 3: Annual Total Citation Per Year

Year	Mean Citation per Article	N	Mean Citation Per Year	Citable Years
2014	22.00	1	2.00	11
2015	54.50	2	5.45	10
2016	73.00	2	8.11	9
2017	24.50	2	3.06	8
2018	109.67	3	15.67	7
2019	37.00	6	6.17	6
2020	25.43	7	5.09	5
2021	56.33	6	14.08	4
2022	28.85	20	9.62	3
2023	6.19	31	3.10	2
2024	0.40	10	0.40	1

Table 4: Most Published Journals, and h, g and m Indexes

Source	TP	TC	h index	g index	m index
International Journal of Production Research	7	324	7	7	0.7
Sustainability	6	94	5	6	1
Journal of Cleaner Production	5	264	4	5	0.4
Environmental Science and Pollution Research	3	48	3	3	0.75
Expert Systems with Applications	3	157	3	3	0.333

International Journal of Production Economics	5	324	3	5	0.429
Journal of self-governance and management economics	3	65	3	3	0.5
Technological forecasting and social change	3	245	3	3	0.75
Annals of operations research	2	30	2	2	1
Business strategy and the environment	2	73	2	2	0.667

TP- Total Production, TC- Total Citation

Most Relevant Journals

The presented Table 4 illustrates the diverse publication outputs, citation impacts, and indices. It is noteworthy that the 'International Journal of Production Research' stands out due to its considerable publication count [7 articles] and significant citations [324 total citations]. In contrast, 'Sustainability', despite a lower number of published articles [6 articles], maintains a robust citation impact [94 total citations] and a well-balanced m-index [1 m-index]. On the other hand, the Journal of Cleaner Production emphasizes cleaner practices, featuring 5 articles and 264 citations. These findings can contribute valuable insights to discussions surrounding journal selection and impact evaluation in academic research.

Table 5: Most Relevant Authors, h, g and m Index

Author	TP	TC	h index	g index	m index
Kumar A	4	109	4	4	1.333
Arakpogun E	3	117	3	3	1
Jayawickrama U	3	117	3	3	1
Liu S	3	117	3	3	1
Luthra S	3	81	3	3	1
Olan F	3	117	3	3	1
Suklan J	3	117	3	3	1
Agrawal R	2	73	2	2	0.667
Gong Y	2	22	2	2	0.667
Gunasekaran A	3	81	2	3	0.667

TP- Total Production, TC- Total Citation

Table 6: Most Relevant Affiliations

Affiliation	Articles
Aligarh Muslim University	4
Amrita Vishwa Vidyapeetham	4
Jilin University	4
Northumbria University	4
Polytechnic School of Federal University of Bahia	4
Shandong University	4
The Hong Kong Polytechnic University	4
Zagazig University	4
Aston University	3
East China University of Science and Technology	3

Most Relevant Authors

In Table 5, Kumar A is distinguished by achieving the highest total production [TP] of 4 along with the highest h, g, and m indices [4, 4, and 1.333 respectively], signifying a substantial and influential body of scholarly work. Arakpogun E, Jayawickrama U, Liu S, Luthra S, Olan F, and Suklan J each exhibit a TP of 3 and demonstrate similar citation metrics, with total citation [TC] values varying from 81 to 117. Their h and g indices remain constant at 3, while their m index stands at 1, illustrating a well-rounded yet impactful research output. Agrawal R and Gong Y possess a lower TP of 2 but uphold commendable h and g indices of 2. Their m index shows a slightly reduced value of 0.667, indicating a consistent research contribution. Gunasekaran A achieves a TP of 3, accompanied by an h index of 2 and a g index of 3, with an m index of 0.667, implying a focused research influence.

Most Relevant Affiliations

Table 6 demonstrates that the affiliations originate from a diverse array of geographical regions, encompassing Asia, Europe, and the Americas. The majority of establishments have contributed an equivalent number of publications [4 publications], indicating a uniform level of research output from these establishments. The inclusion of universities from various parts of the world implies potential research patterns or focal points that hold global significance. The universities listed are esteemed, suggesting noteworthy research contributions. It is advisable to establish contact with these establishments for potential research partnerships. Given their steady output, it is probable that they maintain active research teams. Engaging in collaborative publications can help capitalize on their expertise and enhance the exposure of your research. Participation in conferences and workshops where researchers from these establishments are expected to be present is recommended. This approach can facilitate networking and provide insight into their research methodologies. Involvement in professional organizations and online platforms where researchers from these establishments are involved can also be beneficial.

Most Frequent Terms

Figure 3 and Table 7 show that the predominant terms utilized in current research encompass artificial intelligence, supply chain, decision support systems, decision making, and performance, all of which occupy the top five slots. In contrast, Sustainable Supply Chains and Sustainable Development claim the sixth and seventh positions. This ranking suggests a stronger inclination of the authors towards AI and supply chain research, with less enthusiasm for SSCM and sustainable development topics. Consequently, upcoming researchers have ample opportunity to delve into the realm of AI and SSCM research.

Figure 3: Word Cloud

Table 7: Most Frequent Word

Terms	Frequency
Artificial Intelligence	33
Supply Chain	31
Decision Support Systems	20
Decision Making	18
Performance	16
Sustainable Supply Chains	16
Sustainable Development	15
Management	12
Big Data	11
Optimization	9

Conceptual Structure

The conceptual structure of bibliometric analysis entails a methodical strategy for comprehending the intellectual terrain and development of a particular research area using quantitative techniques. This framework commonly comprises recognizing and examining key themes, topics, and patterns in the literature (30). In the current context co-word analysis is done for developing the thematic map and factorial analysis is done with the help of MCA [multiple correspondence analysis]. The factorial approach, especially with methods such as MCA, greatly improves the examination of categorical data in social sciences by offering a strong technique to reveal connections among various qualitative variables (31).

Thematic Map

A thematic map serves as a visual depiction employed for the examination and comprehension of the associations and patterns present in a corpus of literature. It aids in the detection and classification of research themes derived from keywords, co-occurrence, and various bibliometric measures (32). The thematic map (Figure 4) visually represents the presence of three distinct clusters within the area under investigation. Demonstrated in the first cluster of the thematic map [Figure 4] is the notable rise of blockchain technology as a highly promising and viable area of interest within the domain of sustainable supply chain management and artificial intelligence. In contrast, the second cluster is positioned between the niche theme and motor theme, encompassing variables such as artificial intelligence, supply chain management, and green supply chain practices. Although this cluster displays a high level of development, its degree of relevance remains only moderate, indicating a necessity to shift focus towards enhancing centrality in order for this cluster to potentially evolve into the motor theme. The third cluster suggests that variables such as management practices, big data utilization, and sustainability considerations hold significant relevance, despite exhibiting a moderate degree of developmental progress. Consequently, the thematic map suggests substantial prospects for interdisciplinary inquiry and collaborative efforts, with an emphasis on anticipating future advancements that could elevate key clusters into pivotal themes shaping the future of sustainable supply chains (SSCM). This forward-looking approach will require continuous innovation, alignment with evolving regulatory standards, and the development of novel frameworks that integrate technological advancements with sustainability mandates. The focus, therefore, is on proactively preparing for future trends in AI applications within SSCM, rather than solely examining present trends.

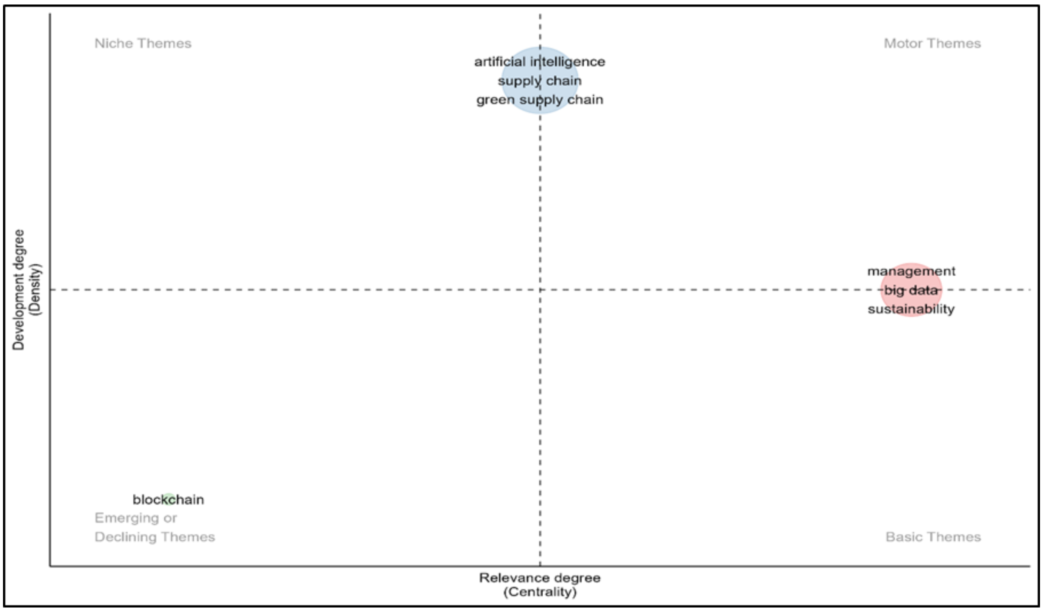

Figure 4: Thematic Map

Factorial Analysis

Factorial analysis (Figure 5), especially Correspondence Factorial Analysis [CFA] and Multiple Correspondence Analysis [MCA], is essential in bibliometric analysis as it offers a strong statistical foundation for investigating and illustrating intricate relationships within extensive datasets (33, 34) Here, the utilization of MCA results in the derivation of three clusters. The variables in the first cluster encompass optimization, circular economy, and sustainability. Predominantly, the first cluster is aligned with dimension one, while the second cluster is primarily associated with dimension two. The variables within the second cluster consist of economic and social impacts, Sustainable development, Multi-objective optimization, decision support systems, decision-making processes, Artificial Intelligence, supply chain management, and Green supply chain principles. The third cluster emerges from both dimension one and dimension two. The variables present in the third cluster include big data, Management, and industry.

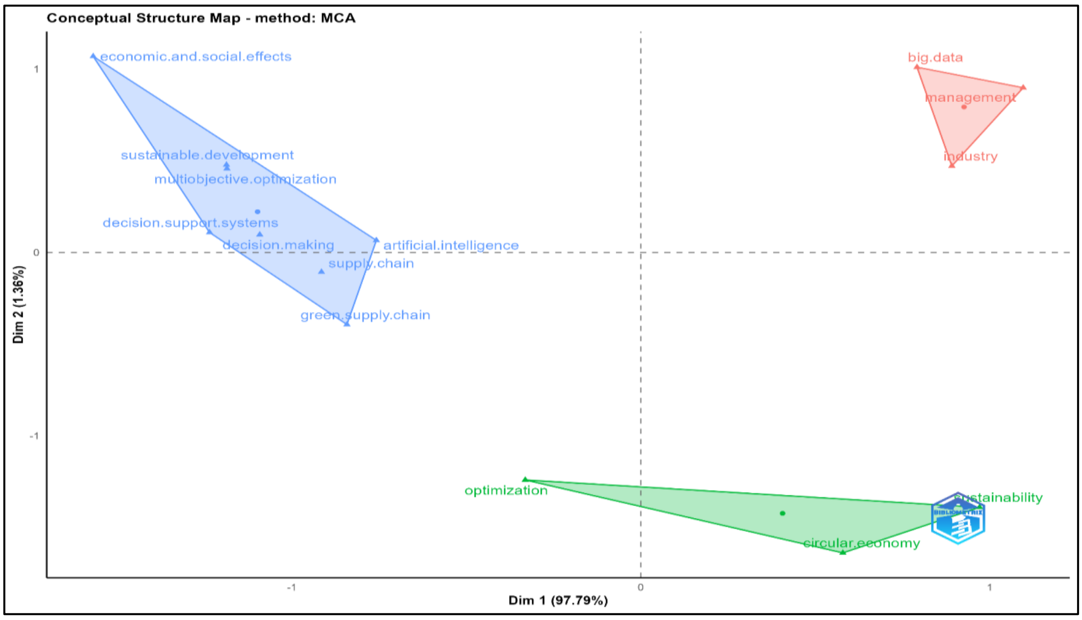

Figure 5: Factorial Map

Figure 6: Country Collaboration Map

Social Structure

Table 8 and Figure 6 elucidate a comprehensive examination of international collaborations in Sustainable Supply Chain Management and Artificial Intelligence. This dataset underscores the complex web of partnerships amongst nations, indicative of the burgeoning global interest in these scholarly areas. India emerges prominently with a preeminent number of collaborations, engaging extensively with nations such as the

United States, the United Kingdom, and France. This phenomenon implies that India is evolving into a pivotal nexus for research associated with sustainability and AI, likely attributable to its nascent role in global supply chains and its swiftly developing AI ecosystem. Both the United Kingdom and the United States exhibit noteworthy collaboration patterns, with the UK emphasizing varied partnerships throughout Europe, Asia, and the United States, whereas the USA maintains a diversified approach with collaborations across numerous continents. China's varied array of collaborations with both European and Asian nations underscores its strategic initiative to bolster its proficiencies in both AI and sustainable supply chains, reflecting its aspirations to assume a leadership role in these domains. France, in contrast, emerges as a vital partner for both developed and emerging economies, signaling its prowess in both fields. Notably, nations such as Australia and Finland and smaller economies, including Egypt and Thailand, exhibit more selective, regionally concentrated collaborations, suggesting an imperative for further expansion in global partnerships.

Table 8: Global Collaboration on SSCM and AI Research

Collaboration From	Collaboration To	Sum of Count
Australia	Singapore (1)	1
China	Austria (1), Finland (1), France (1), Germany (1), Indonesia (1), Pakistan (1), Philippines (1), Sweden (1),	8
Egypt	Saudi Arabia (1)	1
Finland	Sweden (1)	1
France	Australia (1), Qatar (1), Singapore (1), South Africa (1), Turkey (1)	5
India	France (3), Hungary (1), Lithuania (1), Norway (1), Qatar (1), Saudi Arabia (1), Turkey (1), United Kingdom (4), United States (5)	18
Iran	Norway (1)	1
Pakistan	Philippines (1),	1
Thailand	Poland (1)	1
United Kingdom	Australia (1), France (3), Hungary (1), Lithuania (1), Qatar (1), Singapore (1), South Africa(1), United States (3)	12
USA	Egypt (1), France (2), Hungary (1), Iran (1), Norway (1), Saudi Arabia(1), South Africa (1)	8

Future research methodologies should endeavor to cultivate increased cross-continental collaborations, particularly in underrepresented regions such as Africa and South America, to foster a more inclusive global research ecosystem. Furthermore, enhancing connections among countries with selective collaborations, such as Iran, Pakistan, and Thailand, could invigorate innovation by weaving together diverse perspectives. It is imperative that governments and academic institutions allocate resources towards collaborative platforms and funding initiatives to promote deeper research partnerships on pressing global challenges such as SSCM and AI.

Conclusion

The integration of artificial intelligence (AI) with sustainability in supply chains presents significant opportunities for enhancing operational efficiency, fostering eco-conscious practices, and addressing evolving market demands. Managers can leverage AI technologies such as decision support systems, big data analytics, and blockchain to optimize supply chain performance while adhering to sustainability goals. Key managerial decisions should focus on adopting AI-driven solutions that enable multi-objective optimization, ensuring the balance between economic, environmental, and social impacts. By utilizing AI to improve decision-making processes, managers can enhance the agility and resilience of supply chains, particularly in areas like inventory management, demand forecasting, and resource allocation. Additionally, the use of blockchain for transparency and traceability in sustainable supply chains can bolster consumer trust and regulatory compliance. To stay at the forefront of innovation, managers should focus on circular economy practices and explore collaborations with institutions and countries excelling in AI and sustainability research, such as India, the USA, and China. Moreover, industries can accelerate their shift toward green supply chain management by integrating AI-powered tools that improve resource efficiency and reduce waste, thereby aligning with global sustainability standards. Managers must also be proactive in identifying emerging themes in AI and sustainability, such as the moderate development of big data utilization and green supply chain practices, to ensure these areas evolve into central, high-impact aspects of their operations. Strategic investments in these clusters can unlock competitive advantages and future-proof supply chain management.

Abbreviation

SSCM: Sustainable Supply Chain Management, AI: Artificial Intelligence, AIoT: Artificial Intelligence of Things, RFID: Radio-Frequency Identification, WoS: Web of Science, PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses, MCA: Multiple correspondence analysis approach, TP: total production, TC: Total citations, CFA: Correspondence Factorial Analysis.

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Author Contributions

All authors contribute equally. The research was executed through the collective endeavors of all contributors, who participated in every facet of the initiative. This covered the creation and arrangement of the investigation, the collection and scrutiny of information, and the explanation of the discoveries. Furthermore, they engaged in the collaborative drafting and revision of the manuscript to guarantee its precision and lucidity.

Conflict of Interest

The authors hereby affirm that there exist no conflicts of interest pertaining to the publication of this scholarly research article.

Ethics Approval

The study does not require ethics approval as it does not involve human participants, personal data, or interventions that would necessitate such oversight.

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