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Artificial Intelligence Illuminating the Path: A Bibliometric Expedition into Supply Chain Management Research Trends

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Abstract

The research presents a thorough analysis of the integration of artificial intelligence in supply chain management. To obtain reliable information, an objective survey was conducted, which included reviewing 1068 Scopus articles published over the years. From this, 191 publications were selected from the past decade for bibliometric analysis. The review process considered bibliometric factors such as the year of publication, source, type, author, affiliation, and country. Based on the keyword co-occurrence clustering, the research in AI and SCM focuses on logistics management, RFID technology, Industry 4.0 and 5.0 technologies, and other industries such as food, retail, construction, and pharmaceuticals. The results of the literature review and bibliometric analysis indicate that artificial intelligence has gained significant attention in supply chain management research. The ten most productive authors and top three publications were identified. These research findings will enable researchers to gain a better understanding of the role of artificial intelligence in supply chain management. Therefore, this comprehensive analysis spanning from 2014 to 2023 could help experts stay up-to-date with AI applications across various industries.

Keywords: Artificial Intelligence, Supply Chain Management, Bibliometric Analysis, SCOPUS, VOSviewer.

1. Introduction

In today's ever-evolving world of scientific research and business, the utilization of advanced methodologies has become increasingly crucial. Bibliometrics, as argued by (Rehn et al.,2007) stands out as the most reliable and effective method for evaluating scientific research through quantitative analysis of research publications. This approach relies on the assumption that significant scientific discoveries and research results are eventually published in international scientific journals, making them accessible for reading and citation by other researchers. By applying statistical and mathematical methods to books and other media of communication, as described by (Pritchard, 1969), bibliometrics

allows for the evaluation of the quantity and quality of published documents, enabling the observation of trends and patterns in specific research areas (Sultana et al.,2023).

Bibliometric analysis has emerged as a powerful strategy for reporting research trends and impact, gaining popularity due to its ability to provide valuable insights. Indicators commonly observed through bibliometric analysis include the classification of publications, citations, authorship, publication impact, and country, as outlined by (Ahmi & Mohammad, 2019).In the realm of business, the success of a company's supply chain is contingent on integrating and orchestrating all aspects of end- to-end processes, from acquiring materials to delivering finished goods to customers. The current business environment, characterized by greater demand uncertainty, higher supply risk, and rising competitive intensity, demands better visibility across the entire supply chain process. Many progressive companies have already streamlined their information sources and actively exchange real-time information with supply chain partners to enhance their supply chain management (SCM) (Min,2010 & Mahmoodi et al., 2014). With SCM becoming increasingly information-intensive and data-centric, professionals in the field have sought various management techniques to harness the potential of data and make informed decisions.

One such technique is artificial intelligence (AI), which offers the capability to develop machine learning (ML) algorithms capable of forecasting future events and trends based on past data and human behavior patterns. By training algorithms to work with vast datasets and perform complex analyses, ML can produce accurate and superior prediction results. This integration of AI and ML can significantly impact multiple aspects of manufacturing and production processes, including supply chain management, sustainability, predictive maintenance, scheduling, and process optimization (Chen et al., 2004). The adoption of AI in the supply chain domain holds tremendous potential. For instance, the management philosophy of SCM requires comprehending complex, interconnected decision-making processes and constructing intelligent knowledge bases essential for collaborative problem-solving (Neches et al., 1991). Companies have the opportunity to explore AI's potential applicability in addressing these challenges. An example is Eastman Kodak's rule-based expert system, designed to select the ideal order-picking path in a warehouse by capturing the thought processes of experienced order pickers (Min, 2010).

In conclusion, bibliometrics offers a valuable approach to assess scientific research, while AI and ML provide unprecedented opportunities to revolutionize supply chain management and intelligent manufacturing practices. Embracing these advanced methodologies can pave the way for enhanced decision-making and problem-solving in the ever-changing landscape of scientific research and business operations.

2. Literature-Review

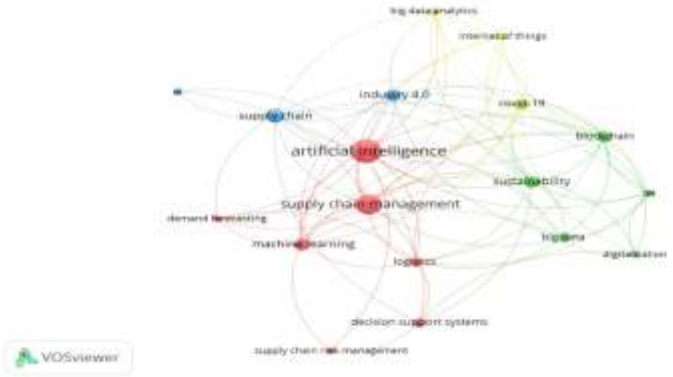
Additionally, (Min, 2010) To synchronise a number of connected but independent stages of combined demand forecasting and planning processes in the SC, an agent-based prediction system was proposed.

Through information sharing across many SC partners and the incorporation of prior experiences, this system can forecast end-user demand. One area of AI's potential application that has not yet been explored is the rising principles of SCM, which calls for the understanding of intricate, interconnected decision- making processes and the development of intelligent knowledge bases necessary for cooperative problem-solving. to be thoroughly investigated. For instance, Eastman Kodak once designed after organising the mental processes of skilled order pickers, a rule-based expert system to select the best item-picking path in a warehouse (Min, 2010). It also suggested an agent-based forecast system to synchronise the SC's joint demand planning and forecasting processes at a number of connected but separate stages. Through information sharing amongst numerous SC partners and experience-based learning, this system can forecast end- user demand (Yu et al., 2019). The SC can synchronise a number of linked but independent stages of joint forecasting and planning of demand processes using an agent-based prediction system that can forecast end consumer demand through data sharing across many SC partners. (Thome et al., & do Carmo et al., 2014) These examples illustrate whether multiple AI subfields (Ahmad & Saxena, 2023), such as expert and agent-based systems, can help manage different SC options, like warehousing, joint demand planning, and inventory control (Kalchaschmidt et al., 2003). Section 2 includes an overview of the research approach used for the descriptive and thematic data analysis. Also, Section 3 thoroughly explains the bibliometric and network analysis. The study's conclusions, effects, limitations, and research originality statement are offered in Sections 4 to 8, as are ideas for additional study; implications, restrictions, and a declaration of the originality of the research are offered, along with recommendations for future study.

One of such approaches might be artificial intelligence (AI), that has existed but must be used in SCM (Blanchard, 2021). By leveraging datasets to generate automated learning models, machine learning is an extension of intelligence that teaches gadgets how to learn., self-training models and combining various methods to identify hidden insights and patterns without being given clear indications by humans (Ahmad et al.,2022). Machine learning techniques can also handle complex and wrong information (Islam and Amin, 2020). As a result, management in SC (SCM) is emphasising the replacement of physical assets with information and evolving into a more information-intensive process (Van der et al., 2005). Understanding that knowledge is essential to SC performance, SC. Professionals have looked into several techniques to manage information more effectively and use it to their advantage while making business decisions (Kettinger et al., 1994).

3. Research Methodology

Data from the database of Scopus as of May 2023 were used in this study. The following search terms were used to find pertinent articles about technologies. such as "Artificial Intelligence" and "Supply Chain Management," which are terms that are utilised in supply chain management. We concentrate on the article titles because they convey the pertinent subject that is crucial to the field of study and its goal. A total of 191 items have been acquired based on the query, allowing us to perform the bibliometric



analysis. To study the data in the bibliometric analysis, some tools are provided. For this study, we utilised VOSviewer to build and visualize the bibliometric networks, Microsoft Excel to determine the frequencies, and (3) Word shift to visualize the keyword co- occurrence.

4. Results and Discussion

Based on the data obtained from the Scopus database, we will analyze the bibliometric attributes such as publication by authorship, active institutions, country productivity, document types, subject area, and year wise. Findings are presented in the form of descending frequencies. The co-occurrence of the authorship, active institutions, country productivity, document types, subject area, years, and keywords is mapped using VOSviewer and graph, and analysis was done based on top 10 sequencing.

4.1 Authors Publications

Table 1. Distribution of Authors (numbers in the figure represent an actual number of Author wise publications).

AUTHOR NAME	No. Of Publications.
Lauras, M.	3
Oger, R.	3
Ponte, B.	3
Agrawal, R.	2
Antoniou, G.	2
Baryannis, G.	2
Cammarano, A.	2
Caputo, M.	2
Costas, J.	2
Dani, S.	2

This table and graph signify the author section showing that Lauras, M. has If you have the biggest quantity of publications, then Oger, R. and Ponte, B.

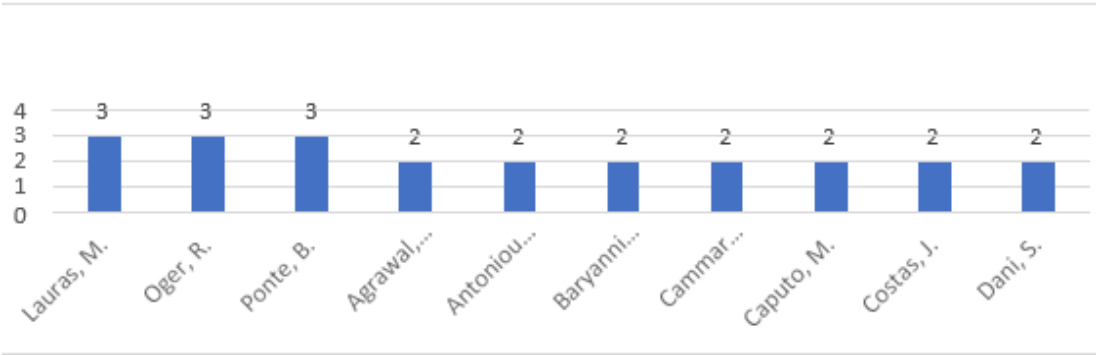


Figure 1. *Distribution of Authors (numbers in the figure represent an actual number of Author wise publications).*

4.2 AFFILIATION / INSTITUTION

Table 2. Distribution of Affiliations (numbers in the figure represent an actual number of test Affiliation-wise publications).

AFFILIATION/INSTITUTION	No. Of Publications.
Université Fédérale Toulouse Midi-Pyrénées	5
University of Plymouth	4
Vilniaus Gedimino Technikos Universitetas	4
London Metropolitan University	3
Universidad de Oviedo	3
Hong Kong Polytechnic University	3
University of Tasmania	3
Aalborg University	3
IMT Mines Albi	3
Indian Institute of Technology Delhi	3

This table and graph signify the affiliation / institution showing that Université Fédérale Toulouse Midi-Pyrénées has the highest number of publications, followed by University of Plymouth . and Vilniaus Gedimino Technikos Universitetas.

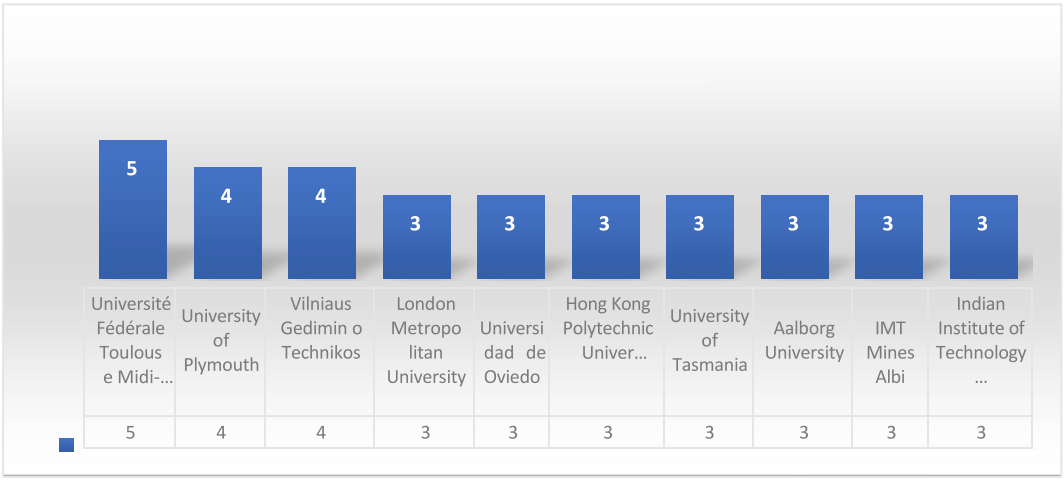


Figure 2. Distribution of Affiliations (numbers in the figure represent an actual number of test Affiliation-wise publications).

4.3 COUNTRY/TERRITORY

Table 3. Distribution of countries (numbers in the figure represent an actual number of country-wise publications).

COUNTRY/TERRITORY	No. Of Publications.
United Kingdom	28
China	26
United States	26
India	21
France	17
Germany	15

This table and graph signify the country/ territory showing that United Kingdom has the highest number of publications, followed by China and United States.

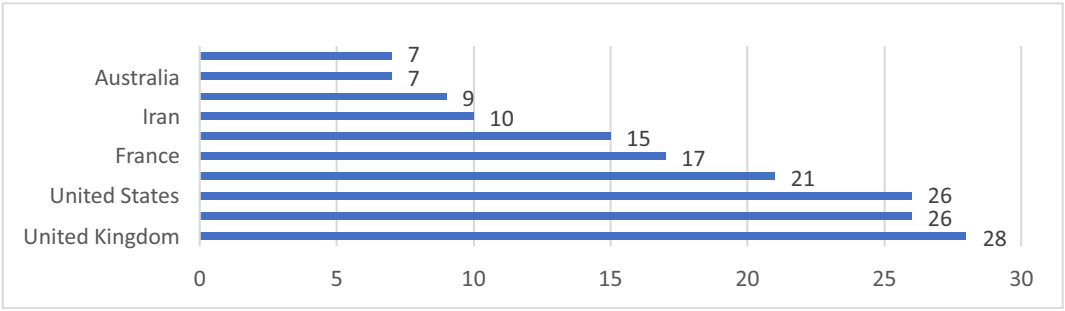


Figure 3. Distribution of countries (numbers in the figure represent an actual number of country-wise publications).

4.4 DOCUMENT TYPE

Table 4. Distribution of Documents Type (numbers in the figure represent an actual number of Document wise publications).

DOCUMENT TYPE	No. Of Publications.
Article	127
Conference Paper	33
Review	27
Book	3

This table and graph signify the document type showing that Article has the highest number of publications, followed by Conference Paper and Review.



Figure 4. Distribution of Documents Type (numbers in the figure represent an actual number of Document wise publications).

4.5 SUBJECT AREA

Table 5. Distribution of Subject Areas (numbers in the figure represent an actual number of Subject-wise publications).

SUBJECT AREA	No. Of Publications.
Engineering	95
Computer Science	93
Business, Management, and Accounting	48
Environmental Science	37
Social Science	37
Decision Sciences	33
Energy	32
Mathematics	18
Economics, Econometrics, and Finance	12
Physics and Astronomy	11

This table and graph signify the subject area showing that Engineering has the highest number of publications, followed by Computer Science and Business ,Management and Accounting.

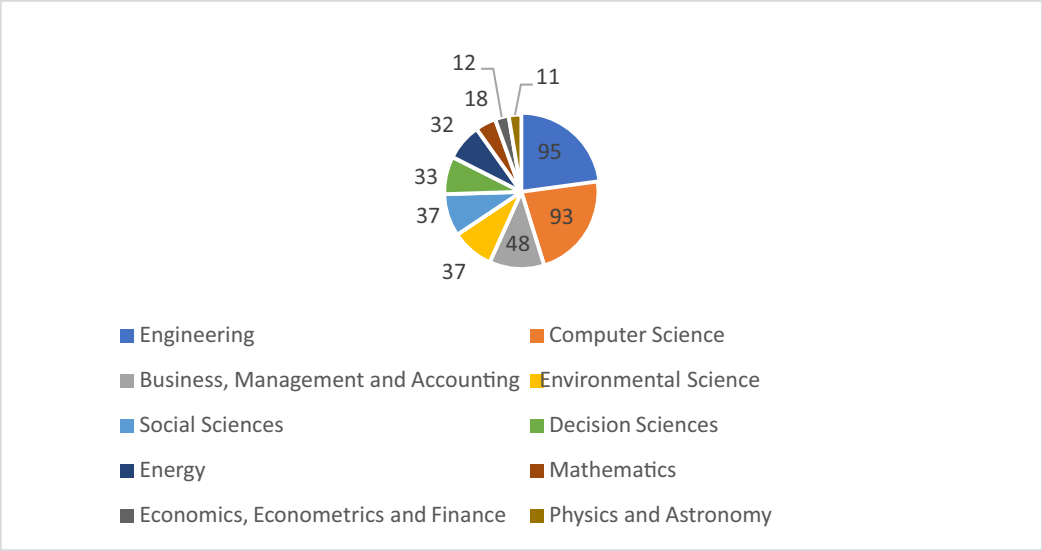


Figure 5. Distribution of Subject Areas (numbers in the figure represent an actual number of Subject-wise publications).

4.6 YEAR

Table 6. Distribution of Years (numbers in the figure represent an actual number of publications yearly).

YEAR	No. Of Publications.
2014	3
2017	6
2015	6
2018	7
2016	7
2020	18
2023	21
2019	21
2021	34
2022	67

This table and graph signify the year showing that 2022 has the highest number of publications, followed by 2021 and 2019,2023.

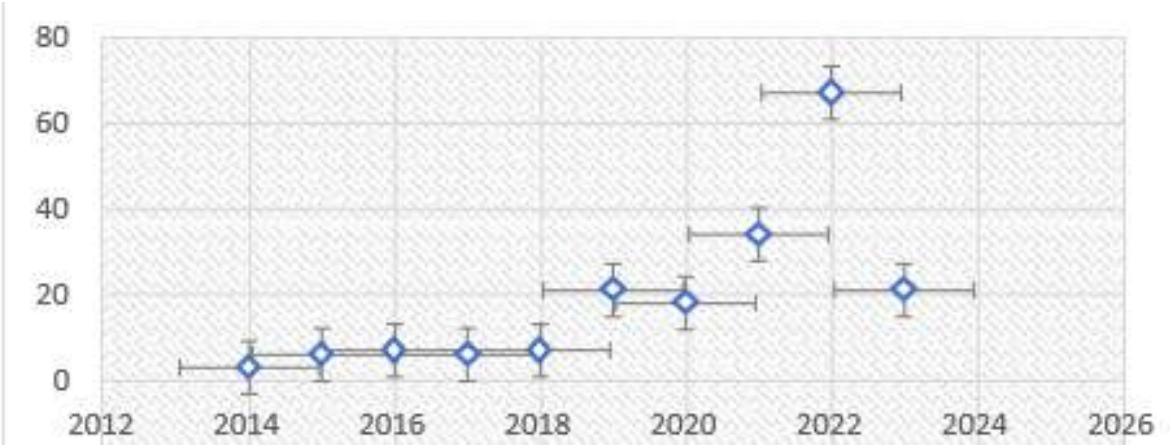


Figure 6. Distribution of Years (numbers in the figure represent an actual number of publications Yearly).

6. Future Scope

Artificial intelligence (AI) is a component of the Web of Things (IoT). has a broad and bright future in supply chain management (SCM). AI and IoT can fundamentally alter how supply chains function by improving efficiency, visibility, and decision-making powers. The following are some crucial areas where IoT and AI can significantly affect supply chain management- Demand forecasting and inventory optimization, Route Optimisation and Logistics, Management of warehouses, Risk management, and resilience.

Overall, utilizing current information, predictive analytics, and automation to create flexible, intelligent, and efficient supply chains is the future of AI in SCM using IoTCombining AI and IoT in a dynamic and increasingly complex business context technologies holds significant promise for supply chain process optimization, decision-making improvement, and competitive advantage.

7.Conclusion

This study has sparked an evaluation of all scholarly papers on the subject of AI and SCM that have been released up to this point. The study uses a few bibliometric variables taken from the Scopus database to report the trend of previous studies. Overall, 1068 papers' bibliometric

data was taken directly from the Scopus dataset. According to the findings, interest in the subject began to grow in 2015 and surged in 2019. English became the language choice as the publication published the majority of the articles. Although just 28% of documents have a single author, 60% do. The data also reveals an upward trend in the number of authors each document over time. In terms of authors who made a contribution, the United States reported having the most, which was followed by Indonesia, China, as well as the UK. In addition to Indonesia, other Asian nations have made major contributions to the body of existing information in this field of study.

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