

Artificial intelligence in supply chain management

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Introduction

The intricate world of supply chain management (SCM) has always been a critical component of the global business landscape. The efficient coordination and management of activities spanning from the procurement of raw materials to the delivery of finished products to end consumers play an instrumental role in the success and competitiveness of organizations. In recent years, the confluence of technological advancements has ushered in a new era, with Artificial Intelligence (AI) poised to transform the very fabric of supply chain operations. This paper embarks on a journey through the realms of AI in Supply Chain Management, presenting a systematic literature review and outlining a research agenda that explores the profound impacts of AI in this domain.

Supply Chain Management (SCM):

Supply chain management is the intricate orchestration of procurement, production, warehousing, distribution, and logistics, ensuring the seamless flow of goods and services from suppliers to customers. It's a web of relationships, processes, and information that links suppliers, manufacturers, distributors, retailers, and consumers—a cornerstone of today's fast-paced global marketplace.

Artificial Intelligence (AI):

Artificial Intelligence (AI) is the pinnacle of technological achievement, endowing machines with the ability to mimic human intelligence. It handles tasks once exclusive to human cognition, such as learning from data, solving complex problems, and making decisions based on patterns and deep insights. AI's remarkable adaptability has the potential to revolutionize supply chain management.

Revolutionizing SCM with AI:

- AI integration in SCM is more than an evolution; it's a transformative shift.
- AI redefines supply chain operations, enhancing efficiency, cutting costs, and elevating decision-making.
- AI is an essential asset for addressing dynamic marketplace challenges.
- This literature review explores current and potential AI applications in SCM.
- It reveals AI's transformative impact on various SCM functions.
- The research agenda charts unexplored AI territories and emerging trends.
- This journey promises to uncover existing AI applications and shape future industry innovations.

Problem Definition

In the landscape of existing research on artificial intelligence (AI) within supply chain management (SCM), a notable gap becomes apparent. While various studies have delved into the applications of AI in SCM, a comprehensive and overarching review is conspicuously absent. Prior reviews have typically zoomed in on specific facets of AI or applications within SCM, creating a fragmented understanding of the broader field. This literature review endeavours to bridge this gap by providing a panoramic view of the current state of AI applications in SCM and by shedding light on the research areas that remain underexplored. The authors have set their sights on this comprehensive exploration to identify not only the existing applications of AI but also the critical research questions that need to be addressed to propel this field forward.

Methodologies Used

1. Search Strategy:

- Conducted a comprehensive search of academic databases, including Scopus, Web of Science, and Google Scholar.
- Utilized a set of carefully chosen keywords related to both supply chain management (SCM) and artificial intelligence (AI), such as "supply chain management," "artificial intelligence," "machine learning," and "optimization."
- Established clear inclusion and exclusion criteria to ensure that selected articles directly addressed the core research question and maintained relevance.

2. Quality Assessment:

- Executed a rigorous quality assessment of the articles by adopting a set of criteria adapted from prior literature reviews.
- These criteria encompassed various factors, including research design, sample size, data collection methods, and the rigor of statistical analysis.
- Employed a scoring system to rate the quality of each article, with higher scores signifying a higher level of quality and reliability.

3. Data Extraction and Analysis:

- Meticulously extracted data from the selected articles, focusing on specific characteristics. These characteristics included:
 - The precise area of SCM that each study addressed.
 - The subfields of SCM investigated in the study.
 - The specific AI techniques applied within the research.
 - Outcomes and findings reported within each article.
 - The particular industry sectors that the study aimed to enhance.
- A systematic coding scheme was employed to categorize the extracted data, allowing for structured analysis and categorization.
- A comprehensive synthesis of this data was then performed to uncover patterns and correlations among the various characteristics, ultimately providing valuable insights into the current and potential applications of AI in SCM.

4. Limitations:

- The authors transparently acknowledged several limitations associated with their methodology, including:
 - The possibility of publication bias, where published articles may not fully represent the entire landscape of AI in SCM.
 - The restriction to English-language articles, potentially excluding valuable insights from non-English sources.
 - The decision to focus exclusively on academic articles, omitting alternative information sources like industry reports or case studies.

These limitations were thoughtfully discussed in the context of their findings, and the authors, highlighted areas for future research that may address these limitations.

Results

- A total of 64 articles met the inclusion criteria for the authors' comprehensive review.
- These articles encompassed diverse fields within supply chain management (SCM), including supply chain, production, marketing, and logistics.
- Predominantly, the reviewed articles concentrated on the application of AI in optimizing SCM processes and enhancing decision-making, with a notable emphasis on predictive analytics and machine learning techniques.
- Among the AI techniques employed, neural networks, genetic algorithms, and fuzzy logic stood out as the most prevalent in the reviewed literature.
- Several key themes emerged from the literature, highlighting the use of AI in SCM for tasks like demand forecasting, inventory management, and supplier selection.
- The analysis of the reviewed articles indicated that the bulk of the literature in AI and SCM is dominated by experimental and practical studies, while there's a relative scarcity of conceptual or philosophical explorations.
- The authors went on to discuss the implications of these findings, shedding light on the potential future direction of AI in SCM, and they suggested specific areas for further research in this evolving field.

Conclusion

In this comprehensive study, our primary aim was to delve into the dynamic realm of artificial intelligence (AI) in supply chain management (SCM). We sought to provide a thorough analysis of the current state-of-the-art, emphasizing key aspects such as prevalent AI techniques, potential areas of application, and the significant impact on subfields within SCM. Furthermore, our exploration identified gaps in existing knowledge and illuminated promising avenues for future research within this burgeoning domain.

Key Focus of the Study:

Our central focus revolved around conducting an in-depth examination of AI's integration into SCM. We scrutinized the prevalent AI techniques employed within SCM studies, elucidated potential AI techniques yet to be explored, and accentuated the subfields and tasks within SCM that have already witnessed improvements through AI. Simultaneously, we contemplated the untapped potential for AI in enhancing other SCM facets. By doing so, our study aimed to cast a wide net over AI's applications in SCM, shedding light on the field's current and future landscape.

Commonly Used AI Techniques:

Our findings revealed that neural networks, genetic algorithms, and fuzzy logic are the cornerstones of AI techniques frequently employed in SCM studies. These techniques have demonstrated their mettle in optimizing processes and enhancing decision-making across various SCM domains. Notably, AI has exhibited remarkable promise in areas such as demand forecasting, inventory management, and supplier selection.

Implications for the Future of AI in SCM:

The implications drawn from our study are profound. AI holds the potential to be a game-changer, offering substantial enhancements to supply chain performance, cost reduction, and elevating customer satisfaction. However, it's crucial to recognize that while AI has already made significant strides, gaps in the literature exist, necessitating further research to harness the full potential of emerging AI techniques and address these voids. In essence, our study serves as both a compass and a call to action, providing a comprehensive overview of the existing AI in SCM literature while laying out a structured guideline for future researchers to navigate this evolving landscape.

References

Research paper: -

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