ARTIFICIAL INTELLIGENCE IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT ETHICAL IMPLICATIONS IN AUTOMATION, TRANSPARENCY & SUSTAINABILITY

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Editors in Chief

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ARTIFICIAL INTELLIGENCE IN SUPPLY CHAIN AND OPERATIONS MANAGEMENT: A MULTIPLE CASE STUDY RESEARCH

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Abstract

In today's complex supply networks sharing information between buyers and suppliers is critical for sustainable competitive advantage. In particular, for both business partners, cost information is highly relevant in purchasing situations. According to empirical studies in literature, artificial neural networks (ANNs) are expected to have a great potential to reveal cost structures by machine learning (ML). In digitally enabled supply chains this information can contribute to cost reduction and operational excellence and lead to win-win situations in supplier relationship management. Nevertheless, authors do not thoroughly investigate how ANNs may support cost estimation for purchasing decisions. Based on a case study from the automotive industry, we evaluate ANNs regarding their capability to gain cost structure data. In an additional comparative study, we benchmark ANNs for cost estimation in purchasing against other promising ML algorithms. Thereby, we apply the cross-industry standard process model for data mining projects. The findings of the studies show that some ML algorithms outperform ANNs regarding accuracy. The research results give indications for choosing the ML approach that promises the best outcome for cost estimations and cost structure information to support decision-making in buyer–supplier relationships.

Keyword: *Artificial intelligence - Machine learning - Supply chain management Operations management - Systematic literature review - Empirical studies*

Introduction

Our analysis uncovered four main research theme data and system requirements, technology deployment processes, (inter)organizational integration, and performance implications in addition to some contextual dimensions. Based on a close examination of extant research, we identify future directions and the potential need of new theoretical perspectives as opposed to established ones in SCM. The resulting research agenda contributes to the literature by providing a systematic overview of opportunities based on the current state and understanding of AI in SCM. Artificial intelligence (AI) refers to the ability of a computer or computer-controlled robot to perform tasks commonly associated with human beings. The intelligence in the term implies that the task being performed by a machine, script, or algorithm would require the use of intelligence, were a human to do it.

The Main Objectives

1. To Identify the sub-fields of AI that are most suitable for SCM applications and then characterize those sub-fields in terms of their usefulness for improving SC efficiency.
2. Synthesise the existing literature dealing with the applications of AI to SCM with respect to their practical implications and technical merits.
3. Develop a hierarchical taxonomy for the existing AI literature and categorise it according to its SCM application areas, problem scope, and methodology.

4. Summarise AI research trends and identify the potential SCM application areas that have not been explored.
5. Discuss the future outlook for extensions of existing AI literature and untapped AI research topics relevant to SCM.

The Taxonomy of the AI Literature

To gain a birds-eye view of past AI studies, we develop a taxonomy using three broad classifi cation schemes: (1) problem scope as a criterion for measuring the breadth and depth of the SCM problems that the AI study attempted to handle; (2) the methodology as a criterion for evaluating the theoretical advances in AI studies and the suitability of particular AI sub-fi elds for SCM applications; and (3) the implementation status as a criterion for assessing the practicality of AI technology. These broad classifi cations will be further subdivided into smaller categories as discussed below in greater detail.

Data Analysis and Insights

AI algorithms can process large volumes of customer data in real-time, extracting valuable insights and patterns that may be challenging for human analysts to discern. Analyzing customer behavior and preferences helps businesses understand their needs, allowing for more personalized and targeted marketing strategies.

Personalized Customer Experiences

AI enables businesses to deliver highly personalized experiences by tailoring recommendations, content, and interactions based on individual customer preferences and past behavior Personalization leads to improved customer satisfaction and loyalty, as customers feel more valued and understood.

Predictive Analytics

AI-powered predictive analytics enables businesses to forecast customer behavior and trends. This helps in anticipating customer needs, identifying potential issues, and making data-driven decisions to enhance customer satisfaction

Virtual Assistants

AI-driven chat bots and virtual assistants provide instant, 24/7 customer support. They can answer queries, resolve issues, and guide customers through various processes, improving overall customer service efficiency. Automation of routine and repetitive tasks frees up human agents to focus on more complex and high-value interactions.

Sentiment Analysis

AI tools can analyze customer sentiments expressed in various channels such as social media, emails, and customer reviews. This helps businesses understand public perception, identify potential issues, and respond promptly to concerns.

Lead Scoring and Qualification

AI algorithms can assess and score leads based on their behavior, interactions, and demographic data. This ensures that sales teams prioritize leads with a higher likelihood of conversion, optimizing the sales process.

Customer Segmentation

AI assists in segmenting customers based on various criteria, allowing businesses to create targeted marketing campaigns for different customer groups. This ensures that marketing efforts are more relevant and effective.

Prediction and Retention

AI helps in predicting customer churn by identifying patterns indicative of potential disengagement. This enables proactive measures to retain customers through targeted retention strategies, special offers, or personalized engagement.

Efficient Resource Allocation

By automating repetitive tasks and streamlining processes, AI allows businesses to allocate resources more efficiently. This includes optimizing staffing levels, managing inventory, and implementing cost-effective marketing strategies.

In conclusion, the integration of AI in customer relationship management empowers businesses to deliver better customer experiences, improve operational efficiency, and gain a competitive edge in today's dynamic business landscape.

Generic Customer Interactions

- Customer interactions are generic and not highly personalized.
- Limited ability to understand individual customer preferences and behaviors.

Reactive Customer Service

- Customer service is mostly reactive, responding to issues as they arise.
- Limited capabilities to proactively address customer needs or predict potential problems.

Limited Automation

- Minimal automation of routine tasks, leading to a heavier workload for human agents.
- Resource-intensive processes with the potential for errors and delays.

Traditional Marketing Strategies

Marketing strategies are based on broad demographics rather than individual customer insights. Limited ability to tailor marketing campaigns to specific customer segments.

Predictive Analytics

Predictive analytics applications leverage AI algorithms to forecast customer behavior and trends. Businesses can use predictive analytics to anticipate customer needs, identify potential issues, and optimize decision-making processes.

Personalization Engines

AI-driven personalization engines analyze customer data to tailor content, recommendations, and experiences based on individual preferences and behaviors. These engines enhance customer engagement by delivering relevant and personalized interactions.

Sentiment Analysis Tools

AI-powered sentiment analysis tools analyze customer sentiments expressed in various channels, such as social media, emails, and reviews. Businesses can gauge public perception, identify customer satisfaction levels, and respond promptly to concerns.

Customer Segmentation Platforms

AI helps in segmenting customers based on various criteria, allowing businesses to create targeted marketing campaigns for different customer groups. Segmentation platforms enhance the relevance and effectiveness of marketing efforts.

Lead Scoring Systems

AI-driven lead scoring systems assess and rank leads based on their behavior, interactions, and demographic data. Sales teams can prioritize leads with a higher likelihood of conversion, optimizing their efforts and improving sales efficiency.

Churn Prediction and Retention Tools

AI applications predict customer churn by analyzing patterns indicative of potential disengagement. Businesses can implement proactive retention strategies, such as personalized offers or targeted communication, to retain customers.

Voice Assistants and Speech Analytics

AI-powered voice assistants and speech analytics applications enable businesses to analyze customer interactions through voice channels. They help in understanding customer sentiments, extracting insights, and improving the overall quality of customer service.

Dynamic Pricing Engines

AI-driven dynamic pricing engines analyze market conditions, competitor pricing, and customer behavior to optimize pricing strategies.Businesses can adjust prices dynamically to maximize revenue and remain competitive.

Automated Email Campaigns

AI automates email campaigns by analyzing customer behavior and preferences to send personalized and targeted emails.

Customer Service Automation

AI automates routine customer service tasks, reducing response times and improving efficiency. Automation in customer service leads to quicker issue resolution and a more seamless customer experience.

Salesforce Einstein

Salesforce, a leading CRM platform, incorporates AI capabilities through Salesforce Einstein. It uses machine learning to analyze customer data, predict trends, automate tasks, and provide personalized recommendations for sales and marketing teams.

HubSpot

HubSpot integrates AI features into platform to improve customer engagement. HubSpot's AI-driven tools help automate tasks, provide insights into customer behavior, and enable personalized marketing campaigns.

Microsoft Dynamics 365 AI

Microsoft's Dynamics 365 CRM platform integrates AI capabilities to offer predictive analytics, virtual agents, and sentiment analysis. These features help organizations gain insights into customer needs, automate routine tasks, and deliver personalized customer experiences.

SAP C/4HANA

SAP C/4HANA is an integrated that leverages AI to enhance customer experiences. It includes AI- driven features for marketing automation, sales intelligence, and customer service to improve engagement across the customer lifecycle.

Future challenges in AI

As AI continues to evolve in the realm of Customer Relationship Management, there are several challenges that organizations may face in the future. Addressing these challenges will be crucial for maximizing the benefits of AI in CRM and ensuring its successful integration. Here are some potential future challenges

Conclusion

The aim of this study is to investigate the applications of AI through the experiences and insights of real industrial cases. The study aims to analyse how AI applications support in various specific processes and to investigate benefits achieved and barriers faced by companies in their implementation. To do so, this research conducts multiple case studies. Our supply chain planning services include Demand & Supply Planning, S &OP Planning and Integrated Business Planning Operations.

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