


Chapter 7

Towards an Explainable Artificial Intelligence in the Realm of Supply Chain Management: A Systematic Literature Review

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ABSTRACT

Explainable Artificial Intelligence (XAI) is increasingly adopted by organizations to innovate, and this is ever more reflected in scholarly work. To illustrate, assess and map research at the intersection of XAI and supply chain management (SCM), we performed a Systematic Literature Review (SLR) of published work indexed in the Clarivate Web of Science (WOS) and Elsevier Scopus databases (the final sample includes 117 articles). A content analysis was deployed to map the focal field in terms of dominant topics and their evolution over time. By deploying the main applications of XAI in the realm of supply chain management, and drivers and barriers, we generate insights on the literature at the intersection of XAI and SCM research. We leverage the SLR findings to provide an updated synopsis of extant scientific work on the focal research area and to develop a future research agenda which sheds light on the drivers and outcomes of XAI adoption for SCM. We conclude this paper by developing an agenda for future research.

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1. INTRODUCTION

The world is rapidly moving towards a digital future, driven by the transformative power of Industry 4.0 technologies. Among the most prominent technologies associated with this shift are Artificial Intelligence (AI), blockchain, the Internet of Things (IoT), and cloud computing (Ghadge et al., 2020; Mugurusi & Oluka, 2021). AI, in particular, has emerged as a key enabler of digital transformation across various sectors, including supply chain management (SCM) (Jaouhari et al., 2022). Defined as the ability of machines to simulate human cognitive functions such as learning, decision-making, and problem-solving, AI has the potential to revolutionize industries by improving efficiency, enhancing decision-making, and driving innovation (Sadeghi R. et al., 2024). While AI is not a new field of study, recent technological advancements have demonstrated its broad applicability and transformative impact in numerous domains (Jauhar et al., 2024). Supply chain management, as one of the critical areas for AI integration, stands to gain significantly from the adoption of AI technologies, providing opportunities to optimize operations, reduce costs, and improve customer satisfaction (Nimmy, 2024).

Supply chain management has traditionally faced challenges related to efficiency, forecasting, inventory management, and logistics optimization (Jaouhari et al., 2023). The introduction of AI technologies into this domain promises to address these challenges by leveraging data to make smarter decisions faster and more accurately (Senoner et al., 2022; Sadeghi R. et al., 2024). AI-driven systems can analyze vast amounts of data and generate insights that humans would otherwise struggle to uncover, enabling organizations to optimize their supply chain processes, from procurement and production to distribution and customer service (El jaouhari et al., 2025). The integration of AI in SCM is not just a matter of technological adoption but a strategic shift that can provide organizations with a competitive advantage (Jaouhari et al., 2023). As businesses move from basic AI applications, such as remote monitoring, to more advanced AI-driven optimization and autonomous systems, the scope of AI in SCM continues to expand (El Jaouhari et al., 2024; Saen et al., 2024).

XAI in SCM has become an increasingly important area of research, with mounting expectations across various sectors and industries (El Jaouhari et al., 2024). In recent years, the scope of XAI has broadened significantly, and its applications have expanded across a wide range of domains, from healthcare to energy (Ahmed et al., 2022). Despite these advancements, the real-world application of XAI remains a challenging endeavor, with many companies still in the early stages of experimentation and pilot projects (Jaouhari et al., 2023). The complexities of XAI implementation in SCM are compounded by the interdependencies between functional areas, organizational boundaries, and the need for cross-level integration within open systems (Schoepf et al., 2024). Moreover, the widespread enthusiasm

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