



History:

Received: March 13, 2025
Revised: April 20, 2025
Accepted: May 2, 2025
Published: May 5, 2025
Collection Year: 2025
Status: Published

Identifiers and Pagination:

Year: 2025
Volume: 10
First Page: 1
Last Page: 8
Publisher ID: 25205951.10.1

Corresponding author:

Md. Mamun Habib School of Business & Entrepreneurship, Independent University, Dhaka - 1212, Bangladesh | Visiting Scientist, University of Texas - Arlington (UTA), USA | Adjunct Professor, Graduate School of Business, Universiti Tun Abdul Razak (UNIRAZAK), Malaysia. +88-02-8431645-53, Ext.2143 WhatsApp: +880 1911 321211, mamunhabib@iub.edu.bd, mamunhabib@unirazak.edu.my

Citation:

Ruzzatin et al. Artificial Intelligence-driven Supply Chain Management: A Literature Review on the Wooden Furniture Industry Adv Bus Financ, 2025 vol 10, p 1- 8

Funding:

The authors received no direct funding for this research.

Competing Interests:

The authors declare no competing interests

Additional information is available at the end of the article.

Review Article

ARTIFICIAL INTELLIGENCE IN SUPPLY CHAIN MANAGEMENT: INSIGHTS FROM THE WOODEN FURNITURE SECTOR – A SYSTEMATIC REVIEW

Shabila Korshi, R.¹, Sabah, S.¹, & Habib, M. M.^{1,2,3}

1. School of Business & Entrepreneurship, Independent University, Plot 16, Block B, Aftabudin Ahmed Road, Bashundhara R/A, Dhaka 1229, Bangladesh
2. Visiting Scientist, University of Texas - Arlington (UTA), USA
3. Adjunct Professor, Graduate School of Business, University Tun Abdul Razak (UNIRAZAK), Malaysia

Abstract

Artificial Intelligence (AI) has emerged as a transformative driver of efficiency, resilience, and sustainability in supply chain management (SCM). Unlike traditional research articles that present new empirical results, this review synthesizes and critically evaluates existing scholarship on AI applications in SCM, with a particular focus on the wooden furniture industry. Drawing from studies published between 2010 and 2024 across leading academic databases, the review categorizes current applications of AI into demand forecasting, inventory management, logistics optimization, and sustainability monitoring. The analysis highlights both the opportunities (efficiency gains, waste reduction, improved customer satisfaction) and the persistent barriers (high costs, data complexity, and workforce skill shortages) to AI adoption. The article concludes by identifying research gaps and offering directions for future inquiry, emphasizing the need for sustainable AI practices tailored to small and medium-sized enterprises (SMEs) within the wooden furniture sector.

Keywords: Artificial Intelligence; Supply Chain Management; Wooden Furniture Industry; Review; Sustainability

Introduction

Supply chains are becoming increasingly complex, driven by globalization, fluctuating consumer demand, and sustainability pressures. In the wooden furniture sector, the supply chain spans from raw material procurement to customized product delivery, making it highly vulnerable to inefficiencies and disruptions. Artificial Intelligence (AI) technologies—including machine learning (ML), predictive analytics, and Internet of Things (IoT) applications—are frequently cited in the literature as potential enablers of efficiency, resilience, and sustainability. Yet, adoption in wooden furniture SCM remains inconsistent.

This article does not present new empirical results. Instead, it reviews and synthesizes the growing body of literature to clarify the current state of AI adoption, highlight its implications for the wooden furniture industry, and identify areas requiring further scholarly attention. The rapid evolution of digital technologies has fundamentally altered supply chain dynamics across global industries, underscoring AI's capacity to promote efficiency and sustainability while addressing implementation challenges.

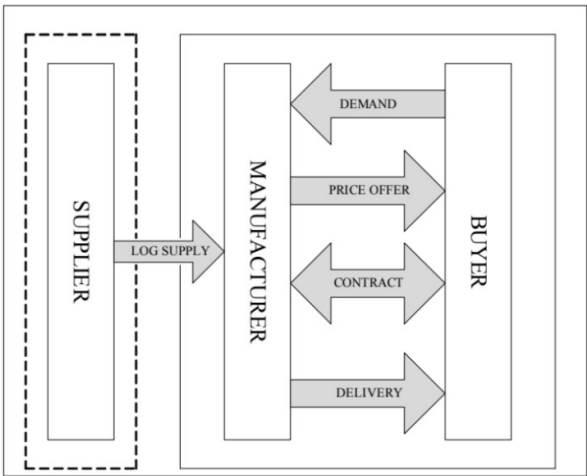


Figure 1: SCM framework (Source: Hisjam, Adi & Shalihuddin, 2012).

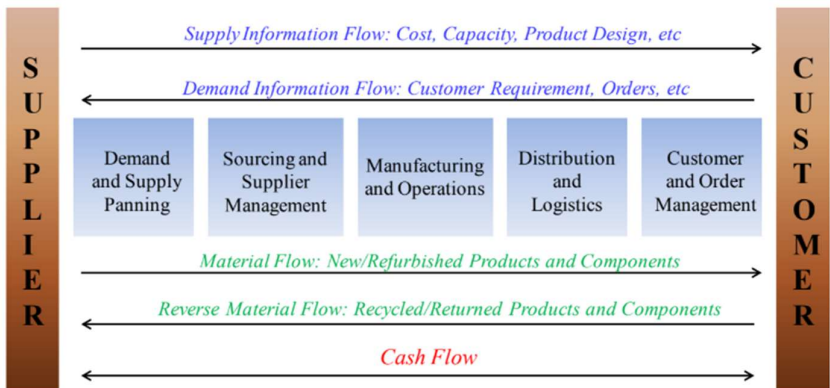


Figure 2: Supply Chain Process (Source: Lauren & Jayashankar, 2015).

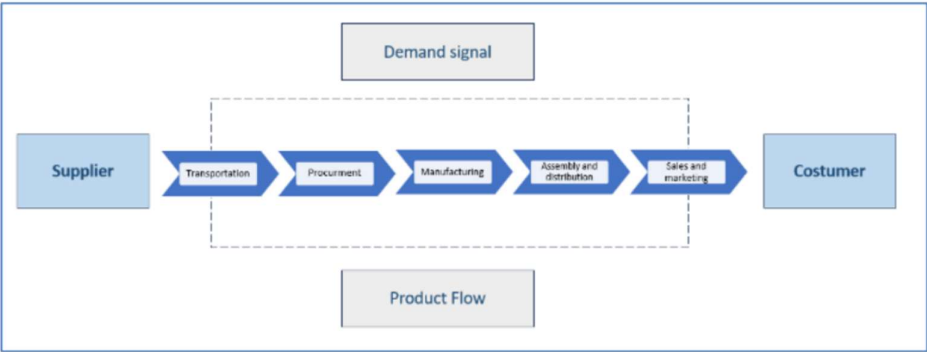


Figure 3: General SCM. (Source: Khaoula, Zoubida & Driss, 2024)

Literature Base and Scope of Review

This review draws on scholarly works published between 2010 and 2024 in journals indexed by Scopus, Web of Science, IEEE Xplore, Springer, Emerald, ScienceDirect, JSTOR, Google Scholar, ProQuest, SAGE Journals, DOAJ, EconLit, and PubMed. The scope includes general AI applications in SCM (all sectors), studies with manufacturing relevance, and research and industry reports on wooden furniture SCM.

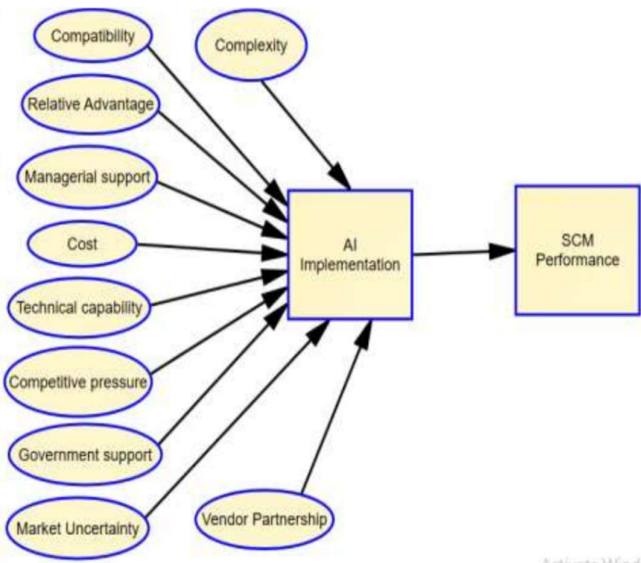


Figure 4: The relationship between influencing and dependent factors influencing SCM. (Source: Purushottam & Faraz, 2023).

A systematic approach was employed to ensure rigor and comprehensiveness. Searches were conducted using keywords such as "artificial intelligence," "supply chain management," "wooden furniture industry," "sustainability," and "operational efficiency," combined with Boolean operators. Inclusion criteria targeted peer-reviewed articles, conference proceedings, and reports with empirical or theoretical depth. Exclusion criteria removed non-English sources, duplicates, and irrelevant studies. A total of 45 sources were selected following title/abstract screening and full-text evaluation. Thematic analysis categorized findings into core areas: SCM fundamentals, AI enhancements, and industry-

specific adaptations. By synthesizing these sources, the review consolidates fragmented knowledge into coherent themes, aligning with established review protocols (Pournader et al., 2021).

Thematic Review of AI Applications in SCM

Foundations of Supply Chain Management

SCM serves as the backbone for value creation, orchestrating the flow of materials, information, and finances from suppliers to end consumers. In essence, it integrates procurement, manufacturing, logistics, and distribution to minimize costs and maximize efficiency (Lu & Swaminathan, 2015). Contemporary SCM emphasizes sustainability, incorporating reverse logistics for recycling and waste reduction (Khlie et al., 2024).



Figure 5: Model of data driven Supply Chain Management. (Source: Abraham & Daphne, 2022)

Across industries, AI contributes to demand forecasting through predictive analytics, inventory optimization to reduce stock-outs and overstock, logistics and transportation via route optimization, and risk detection through anomaly monitoring. Visual representations in the literature, such as SCM frameworks (Hisjam et al., 2012) and process diagrams (Lu & Swaminathan, 2015), illustrate interconnected stages: raw material sourcing, production, and delivery. These models highlight bidirectional flows—material forward and information backward—to enable adaptive responses to market fluctuations. Collaboration among stakeholders further streamlines operations, reducing inventory levels and enhancing productivity (Akbari & Do, 2021).

AI Transformations in General SCM

AI has redefined SCM by introducing intelligent systems that process vast datasets for predictive insights. Machine learning algorithms excel in demand forecasting, analyzing historical patterns to mitigate uncertainties (Abhulimen & Ejike, 2024). Predictive analytics optimizes inventory, preventing overstocking, while natural language processing aids in supplier communications (Goswami et al., 2024).

Industry 4.0 paradigms position AI as a catalyst for automation, resilience, and traceability (Toorajipour et al., 2021). Factors influencing adoption include technological compatibility, competitive pressures, and regulatory support (Usmani et al., 2023). Diagrams depicting data-driven SCM models (Abraham & Daphne, 2022) and influencing variables (Purushottam & Faraz, 2023) underscore AI's role in cost

reduction and agility. Despite benefits, challenges like data quality and integration complexities are noted (Choi et al., 2018).

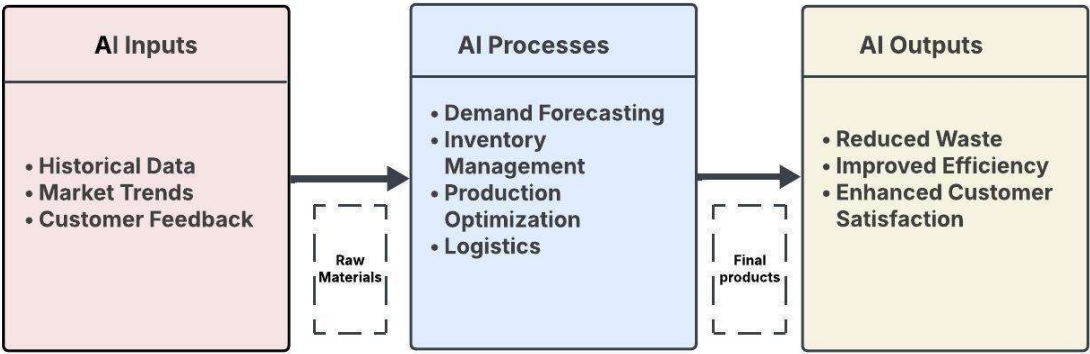


Figure 6: AI in the Wooden Furniture Industry

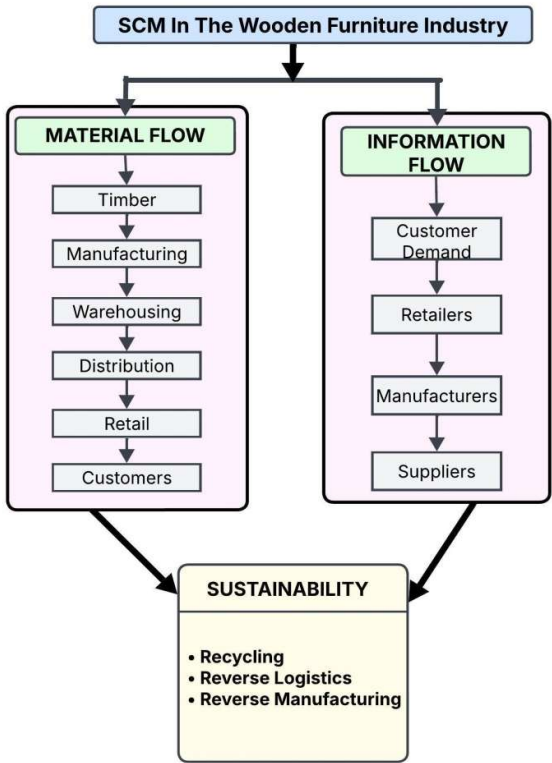


Figure 7: Supply Chain Management of the Wooden Furniture Industry

AI Applications Tailored to the Wooden Furniture Industry

While AI's impact is well-documented in sectors like textiles and construction, its application in wooden furniture remains underexplored (Schreiber et al., 2024). This industry, prone to raw material shortages and customization demands, benefits from AI in forecasting market trends and managing volatile wood supplies (Sachin et al., 2018). The wooden furniture supply chain presents distinct challenges—high raw material dependency, custom production, and sustainability mandates. Literature identifies several AI contributions: IoT-enabled monitoring for real-time inventory tracking, machine learning forecasting

to balance supply and demand, sustainability tracking ensuring efficient wood utilization and carbon footprint monitoring, and transparency in sourcing, particularly in sustainable forestry certification.

AI enhances logistics by optimizing routes, lowering emissions, and improving traceability from forest to factory (Ivanov et al., 2016; Li, 2024). Studies highlight efficiency gains in production scheduling and risk mitigation (Fangxi Li, 2024). However, barriers such as high initial costs and skill shortages hinder widespread adoption, particularly in SMEs (Rameshwar et al., 2016). Integration with IoT promotes energy-efficient operations, aligning with green manufacturing goals (Kusiak, 2017).

Synthesis and Critical Discussion

AI's role in wooden furniture SCM can be framed through an input-process-output lens (Figure 6 in original conceptualization). Inputs encompass diverse data sources (e.g., sales records, consumer feedback), processed via algorithms for forecasting and optimization, yielding outputs like reduced waste and heightened customer satisfaction. This model illustrates AI's enhancement of traditional flows (Figure 7), where material and information exchanges ensure efficiency and sustainability.

The literature consistently acknowledges AI's transformative potential in SCM, but adoption in the wooden furniture industry remains nascent. Unlike large multinational manufacturers, SMEs face constraints that limit rapid implementation. Opportunities highlighted include operational efficiency and cost reduction, improved sustainability and waste minimization, competitive advantage through customization, and enhanced customer satisfaction. Barriers identified encompass high implementation costs for SMEs, data infrastructure and security challenges, workforce skill shortages in AI and data analytics, and energy demands of AI itself.

Opportunities abound: AI-driven forecasting aligns production with demand, curbing overproduction (Khlie et al., 2024). Logistics optimizations bolster resilience against disruptions (Ivanov et al., 2016). Yet, challenges persist—financial burdens for SMEs, data infrastructure needs, and environmental trade-offs from AI's energy consumption (Ali et al., 2024). Workforce upskilling is crucial to overcome skill gaps (Kamble et al., 2018).

Two critical research gaps emerge: scalability of AI solutions tailored to SMEs and integration of sustainability and AI, balancing efficiency with ecological responsibility. Gaps in the literature include limited empirical studies on AI's long-term impacts in wooden furniture and insufficient focus on ethical considerations, such as data privacy. Future research should focus on case studies, comparative sectoral analyses, and the design of affordable, context-specific AI systems. Strategic adoption, supported by collaborations between academia, industry, and governments, is recommended to realize AI's full potential.

Conclusions and Recommendations

This review highlights how AI is reshaping SCM, with clear applications in the wooden furniture industry. While opportunities include efficiency, transparency, and sustainability, barriers such as cost, skills, and data infrastructure persist. By consolidating dispersed literature, this review underscores AI's potential as both an operational and strategic enabler in the evolution of wooden furniture supply chains. Future studies must develop SME-oriented models and explore sustainable AI adoption strategies to ensure inclusive technological advancement.

Recommendations for practitioners include pilot AI implementations in high-impact areas like inventory management. Policymakers should incentivize AI adoption through grants and regulations promoting green tech. Ultimately, ethical and sustainable AI integration will drive enduring industry growth.

Abbreviations

- AI: Artificial Intelligence

- SCM: Supply Chain Management
- IoT: Internet of Things
- SMEs: Small and Medium-Sized Enterprises
- ML: Machine Learning

References

- Abhulimen, A. O., & Ejike, O. G. (2024). Solving supply chain management issues with AI and Big Data analytics for future operational efficiency. *Computer Science & IT Research Journal*, 5(8), 1780-1805. <https://doi.org/10.51594/csitrj.v5i8.1396>
- Akbari, M., & Do, T. N. A. (2021). A systematic review of machine learning in logistics and supply chain management: Current trends and future directions. *Benchmarking: An International Journal*, 28(10), 2977-3005.
- Ali, B. M., Majeed, M. A., Latif, N., & Aldrickzler, R. (2024). Sustainable supply chain management practices for environmental and social integrity. *Journal of Ecohumanism*, 3(5), 1000-1016. <https://doi.org/10.62754/joe.v3i5.3951>
- Azizi, M., & Faezipour, M. (2016). Furniture industry management by applying SCM. *Cogent Business & Management*, 3(1), 1155811. <https://doi.org/10.1080/23311975.2016.1155811>
- Choi, T.-M., Wallace, S. W., & Wang, Y. (2018). Big data analytics in operations management. *Production and Operations Management*, 27(10), 1868-1883. <https://doi.org/10.1111/poms.12838>
- Dubey, R., Gunasekaran, A., Childe, S. J., Wamba, S. F., & Papadopoulos, T. (2016). The impact of big data on world-class sustainable manufacturing. *The International Journal of Advanced Manufacturing Technology*, 84, 631-645. <https://doi.org/10.1007/s00170-015-7674-1>
- Goswami, S. S., Mondal, S., Sarkar, S., Gupta, K. K., Sahoo, S. K., & Halder, R. (2024). Artificial intelligence-enabled supply chain management: Unlocking new opportunities and challenges. *Artificial Intelligence and Applications*, 3(1), 110-121. <https://doi.org/10.47852/bonviewAIA42021814>
- Hisjam, M., Adi, K., & Shalihuddin, A. (2012). [Source for SCM framework – as cited in original].
- Ivanov, D., Pavlov, A., Dolgui, A., Pavlov, D., & Sokolov, B. (2016). Disruption-driven supply chain (re)-planning and performance impact assessment with consideration of pro-active and recovery policies. *Transportation Research Part E: Logistics and Transportation Review*, 90, 7-24.
- Kamble, S. S., Gunasekaran, A., & Gawankar, S. A. (2018). Sustainable Industry 4.0 framework: A systematic literature review identifying the current trends and future perspectives. *Process Safety and Environmental Protection*, 117, 408-425. <https://doi.org/10.1016/j.psep.2018.05.009>
- Khlie, K., Benmamoun, Z., Jebbor, I., & Serrou, D. (2024). Generative AI for enhanced operations and supply chain management. *Journal of Infrastructure, Policy and Development*, 8(10), 6637. <https://doi.org/10.24294/jipd.v8i10.6637>
- Kusiak, A. (2017). Smart manufacturing must embrace big data. *Nature*, 544(7648), 23-25. <https://doi.org/10.1038/544023a>
- Li, F. (2024). Challenges and opportunities for sustainable supply chain management. *Frontiers in Business, Economics and Management*, 15(1), 160-163. <https://doi.org/10.54097/s2qda813>

Lu, L. X., & Swaminathan, J. M. (2015). Supply chain management. In *International Encyclopedia of the Social & Behavioral Sciences* (2nd ed., pp. 709-713). Elsevier. <https://doi.org/10.1016/B978-0-08-097086-8.73032-5>

Pournader, M., Ghaderi, H., Hassanzadegan, A., & Fahimnia, B. (2021). Artificial intelligence applications in supply chain management. *International Journal of Production Economics*, 241, 108250. <https://doi.org/10.1016/j.ijpe.2021.108250>

Schreiber, D., Froehlich, C., Feil, A. A., & Becker, V. J. (2024). Industry 4.0 technologies in a Brazilian furniture industry. *Revista de Administração da UFSM*, 17(2), e2. <https://doi.org/10.5902/1983465974934>

Toorajipour, R., Sohrabpour, V., Nazarpour, A., Oghazi, P., & Fischl, M. (2021). Artificial intelligence in supply chain management: A systematic literature review. *Journal of Business Research*, 122, 502-517. <https://doi.org/10.1016/j.jbusres.2020.09.009>

Usmani, D. A., Sharma, M., Bung, P., Kumar, R., Ahmad, F., & Gupta, A. (2023). Key variables influencing artificial intelligence (AI) implementation in supply chain management (SCM): An empirical analysis on SMEs. *Migration Letters*, 20(S11), 1284-1307. <https://doi.org/10.59670/ml.v20iS11.9083>



© 2025The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license. You are free to:

Share — copy and redistribute the material in any medium or format. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Under the following terms: Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes are made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. No additional restrictions. You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits