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Fin Tech Innovation and Sustainable Supply Chains: Leveraging Digital Finance Innovation for ESG-Based Procurement, Supplier Risk Assessment, and Environmental Performance Monitoring

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ABSTRACT

The convergence of financial technology (Fin Tech) and sustainable supply chain management (SSCM) has revamped the operational and strategic frameworks for global trade. Fin Tech advancements are rapidly becoming a major factor in assisting companies in meeting environmental, social, and governance (ESG) requirements, which are essential for fostering sustainable growth. The ways that digital finance tools—like block chain, AI, big data analytics, and digital payment platforms—assist in supplier risk assessment, environmental performance tracking, and ESG-based procurement are examined in this article. Drawing on recent empirical and theoretical literature, this study uses a qualitative approach and secondary data to investigate Fin Tech's revolutionary role in SSCM. Key findings indicate that digital finance technologies improve environmental monitoring by enabling supply chain traceability and transparency, speed up procurement processes through real-time ESG compliance checks, and enhance supplier risk management through predictive analytics.The paper contributes to the growing body of research on sustainability and digital transformation by providing a methodical analysis of Fin Tech capabilities. Policy implications emphasize the need for regulatory support, cross-sector collaboration, and capacity building to fully fulfill Fin Tech's promise in sustainable supply chains. The results provide credence to a digital-first approach to sustainability that places an emphasis on accountability, performance, and resilience.

Keywords*: Fin Tech, Sustainable Supply Chains, ESG Procurement, Supplier Risk Assessment, Environmental Monitoring, Block chain, AI, Big Data, Digital Finance.*

INTRODUCTION

The rapidly evolving global commerce landscape has given rise to the twin pillars of sustainability and digital transformation, which are influencing the future of supply chain management. Sustainable supply chain management (SSCM), which integrates environmental, social, and governance (ESG) considerations into traditional supply chain operations, is a crucial component of corporate responsibility and long-term resilience. At the same time, financial technology, or Fin Tech, is revolutionizing the financial services industry by offering state-of-the-art digital solutions that enhance operational effectiveness, transparency, and strategic decision-making. Fin Tech technology can now be used to encourage sustainability in global supply chains thanks to the convergence of these sectors (Xu *et al*. 2025).

Fintech encompasses a wide range of technologies, including block chain, artificial intelligence (AI), machine learning, big data analytics, digital wallets, smart contracts, and decentralized

financing (DeFi). These technologies are increasingly being utilized to assist supply chain finance (SCF), risk management, ESG compliance, and sustainability performance monitoring in addition to standard banking and investment services (Sikander *et al.* 2024). FinTech and SSCM together offer organizations unprecedented opportunities to align their financial operations with sustainability goals by facilitating ESG-based procurement, real-time supplier risk assessment, and environmental performance monitoring (Jain *et al*. 2023).

ESG criteria, once considered peripheral to core business operations, are now recognized as fundamental indicators of corporate sustainability. Organizations face mounting pressure from regulators, investors, consumers, and non-governmental organizations to demonstrate responsible sourcing, ethical labor practices, and environmental stewardship. Fin Tech tools are particularly well-suited to meet these demands, providing digital platforms that enable traceability, automate compliance checks, and offer granular insights into supply chain operations. For instance, block chain technology ensures immutable record-keeping, supporting transparent sourcing and ethical procurement (Wang & Sarkis, 2022).

The global COVID-19 pandemic exposed significant flaws in supply networks, emphasizing the value of adaptation, resilience, and transparency. As a result, businesses are increasingly reorganizing their supply chains through the use of digital technologies. The rise of fintech innovations is a significant component driving this transition. Digital finance solutions facilitate data-driven decision-making and foster a more thorough comprehension of supply chain possibilities and risks by merging financial data with ESG criteria (Mollenkopf *et al*. 2022).
One of the Fin Tech innovations that has had the largest influence on sustainable supply chains is block chain. By creating a decentralized and secure ledger of transactions, block chain makes it possible to have transparent and unbreakable records of product origins, supplier certifications, and ESG standard compliance.
It improves accountability and reduces the likelihood of unethical or greenwashing tactics by enabling stakeholders to provide verified data in real time. Companies like IBM and Maersk have tested block chain-based supply chain systems to track carbon emissions, fair labor standards, and ethical sourcing (Saberi *et al.* 2019). The development of SSCM also depends on artificial intelligence and big data analytics. Large amounts of data from suppliers may now be collected, processed, and evaluated by businesses. The capacity of AI systems to assess supplier performance, spot potential ESG violations, and forecast environmental impacts enables proactive risk management. For example, predictive analytics can help companies find suppliers in high-risk industries or regions and adjust their sourcing strategies accordingly (Sodhi & Tang, 2020).

Fin Tech technologies can help small and medium-sized businesses (SMEs) get sustainable finance, enabling them to engage in ethical supply chains and embrace environmentally friendly practices. Environmental performance monitoring, where digital sensors, Internet of Things (IoT) devices, and remote monitoring systems produce real-time data on emissions, resource consumption, and environmental compliance, is another critical area where Fin Tech may create sustainable outcomes. By automating transactions, decreasing paper-based workflows, and enhancing transparency, these tools enable businesses to use dynamic discounting, green finance efforts, and ESG-linked payments, further simplifying procurement procedures (Kouhizadeh *et al*. 2021).

When paired with Fin Tech platforms, these data streams can be assessed and displayed to support strategic sustainability reporting and adherence to global standards like as the Global Reporting Initiative (GRI) and the Task Force on Climate-related Financial Disclosures (TCFD).
Despite the growing recognition of Fin Tech's potential, there are still certain challenges. Data interoperability problems, cybersecurity risks, ambiguous legislation, and low levels of digital literacy among providers—particularly in developing countries—may all hinder adoption. Moreover, businesses are often unable to adequately adapt and integrate new skills due to the rapid pace of technological advancement. Governments, trade groups, IT firms, and academic institutions must thus collaborate to create an atmosphere that encourages Fin Tech-driven sustainability.

This study aims to explore the potential strategic applications of Fin Tech technologies to enhance sustainable supply chain operations, with a focus on supplier risk assessment, environmental performance monitoring, and ESG-based buying. Through a comprehensive literature review and secondary data analysis, the study seeks to answer significant concerns about the effectiveness, scalability, and policy implications of digital financial technologies in promoting sustainability. This research is important because it has the ability to impact philosophy and practice. Theoretically, by highlighting Fin Tech's role as a catalyst for ethical and responsible corporate activity, it advances the growing field of digital sustainability.

Practically speaking, it provides information and suggestions for supply chain managers, lawmakers, and software developers that want to match financial innovation with sustainability norms. Integrating Fin Tech into supply chain sustainability will become more than just a competitive advantage as the world economy grows increasingly digitalized and networked. Using technology to promote systemic change is essential to creating robust, open, and moral supply chains. With a plan for leveraging Fin Tech to create a sustainable future, this paper aims to map that course.

Research Objectives

1. To analyze how Fin Tech innovations, contribute to ESG-based procurement practices within sustainable supply chains.
2. To examine the role of digital finance tools in supplier risk assessment, particularly in identifying ESG-related risks.
3. To investigate the application of Fin Tech in environmental performance monitoring and compliance tracking across global supply chains.
4. To assess the benefits and challenges associated with the integration of FinTech technologies into sustainable supply chain management.
5. To propose policy recommendations and best practices for leveraging FinTech to enhance sustainability in supply chains.

Research Questions

1. In what ways do Fin Tech innovations facilitate ESG-compliant procurement processes in supply chains?
2. How can digital finance tools improve supplier risk assessment and early detection of ESG-related issues?
3. What technological solutions offered by Fin Tech are most effective in monitoring and reporting environmental performance?
4. What are the main barriers to adopting Fin Tech for sustainability purposes in supply chains, and how can they be addressed?
5. What policy frameworks or institutional supports are necessary to promote the integration of Fin Tech into sustainable supply chain practices?

LITERATURE REVIEW

The integration of Fin Tech technology into sustainable supply chains has emerged as a thriving field of research throughout the last 20 years. From the earliest advancements in digital payments to the most recent advancements in block chain, artificial intelligence, and data-driven analytics, researchers have consistently studied how these technologies enhance transparency, efficiency, and ESG compliance across global supply networks. This literature review critically examines significant themes, findings, and trends from scholarly views.

Foundations of Fin Tech in Supply Chain Management

The primary function of digital finance tools in enhancing operational efficiency was the focus of early research. (Brynjolfsson & McAfee, 2014) claim that by automating conventional procedures and reducing transaction costs, digital transformation changed business strategies. At the same time, supply chain experts emphasized how crucial it is to use digital tools in order to manage supplier relationships and maximize resource allocation (Christopher, 2011; Mentzer *et al*. 2008). Despite the fact that sustainability concerns were still relatively new at the time, authors like (Seuring & Müller, 2008) promoted the incorporation of digital systems with social and environmental norms. The foundation for integrating ESG with financial technologies was established by this.

Emergence of ESG Metrics and Blockchain-Based Procurement

Researchers looked into how Fin Tech may help with sustainable procurement because of the growth of ESG investing and global frameworks like the Paris Agreement and SDG 2030. According to (Saberi *et al*. 2019), block chain can revolutionize supply chain management (SSCM) by facilitating real-time ESG monitoring, fraud reduction, and traceability. Their research offered factual proof of block chain's ability to trace the origin of raw materials and validate green credentials. Similarly, by looking at obstacles to supply chain block chain implementation, (Kouhizadeh *et al.*2020) broadened this viewpoint. Their research uncovered institutional and technological issues, particularly in poorer nations where infrastructure and digital literacy are still lacking. Positive outcomes in terms of transparency and building confidence were shown by pilot initiatives (IBM, Maersk).

Fin Tech and Predictive Analytics for Supplier Risk Assessment

The use of machine learning and artificial intelligence (AI) technologies increased as academics examined their role in real-time risk management. AI-based platforms could go through social media, supplier data, and public records to find financial instability or ESG violations (Kumar *et al*., 2021). By incorporating big data from IoT devices, businesses were further empowered to monitor production and logistical networks for signs of inefficiency, pollution, or labor exploitation. Furthermore, (Jain *et al*. 2023) provided a comprehensive examination of the manner in which predictive analytics support resilience planning and ESG risk reduction. Their analysis indicates that Fortune 500 companies use over 300 digital technologies to evaluate the sustainability of their supply chains.

Environmental Monitoring through Fin Tech Applications

A growing body of research has focused on environmental data monitoring through Fin Tech platforms. (Wang & Sarkis, 2022) looked at case studies of supply chains powered by block chain and digital sensors that included carbon monitoring, water use, and deforestation indicators. Integration with reporting frameworks like TCFD and GRI increased standards and decision-making transparency. Procurement officers and compliance managers may appreciate the actionable insights that Fin Tech-enabled dashboards could offer from complex environmental data (Chen *et al*. 2021). This was especially crucial for industries with large carbon footprints, such as food processing, textiles, and mining.

Fin Tech Access for SMEs and Ethical Financing

Recent studies have also looked at how digital banking promotes diversity. For instance, (Sahay *et al*. 2022) examined how mobile money platforms and decentralized finance (DeFi) services offered microloans and green financing to small suppliers in Asia and Africa. The democratization of finance allowed SMEs to participate in supply chains certified by ESG and invest in cleaner technology. Furthermore, ESG-aligned Fin Tech companies that prioritized climate fin tech, impact investment, and loans related to sustainability were more prevalent in venture funding trends (EY, 2023). These advancements not only provided funding but also enhanced supply chain accountability.

Barriers to Adoption and Future Directions

Despite the potential, some studies found barriers such fragmented data systems, costly implementation, ambiguous rules, and cybersecurity risks. A 2023 study by the World Economic Forum found that only 27% of Fin Tech businesses had fully incorporated ESG considerations into their decision-making procedures. Future research strategies should promote supplier digital upskilling programs, form cross-sector partnerships, and harmonize data standards across jurisdictions, according to (Xu *et al*. 2025).

Conclusion

Research released between 2005 and 2025 indicates that the role of Fin Tech in sustainable supply chains has changed dramatically. From early digital integration to sophisticated ESG compliance

solutions, researchers have demonstrated a clear innovation trajectory. Technologies like block chain, artificial intelligence, and digital finance platforms are becoming increasingly important for risk assessment, procurement, and environmental performance monitoring. To fully achieve their potential, however, adoption barriers must be removed and technology innovation must be coordinated with institutional frameworks.

METHODOLOGY

This study uses a qualitative-descriptive technique based on secondary and research papers data analysis to investigate how Fin Tech innovations help sustainable supply chains in World. The study evaluates the uptake, benefits, and limitations of digital finance technologies in World, with a focus on supplier risk assessment, environmental performance monitoring, and ESG-based purchasing.

Research Design

To investigate how Fin tech innovation impacts sustainable supply chains in World, a comprehensive study methodology is recommended, with a focus on environmental performance monitoring, supplier risk assessment, and ESG-based procurement. This technique, which also makes use of software tools for data analysis and visualization as well as theme analysis to identify relevant codes and subjects, involves a systematic review of 30 academic articles.

Approach: Thematic Analysis based on Qualitative Data Analysis.

Objective: To list and condense the key points of World's recent literature on fin tech innovation and sustainable supply chains.

Scope: Focus on studies related to:

- Fintech applications in supply chain finance.
- ESG-based procurement practices.
- Supplier risk assessment methodologies.
- Environmental performance monitoring tools.

Data Collection

Selection Criteria

i) **Inclusion**: peer-reviewed publications and research about World published from 2015 to 2025.
ii) **Exclusion**: studies without empirical data or those unrelated to sustainable supply chains or fintech.

Databases Searched:

- Google Scholar
- ScienceDirect
- SpringerLink
- Emerald Insight
- HEC Digital Library.

Thematic Analysis

Software Tools

- **NVivo**: For qualitative data coding and theme development.
- **MAXQDA**: For cross-validation of themes and advanced visualization.

Process

1. **Familiarization**: Reading and re-reading selected papers to understand the content.
2. **Coding**: Identifying significant statements and assigning initial codes.
3. **Theme Development**: Grouping codes into potential themes.
4. **Reviewing Themes**: Ensuring themes accurately represent the data.
5. **Defining and Naming Themes**: Clearly defining each theme and its relevance.

Data Visualization and Interpretation

Graphical Tools

- **Word Clouds**: To highlight frequently occurring terms.
- **Thematic Maps**: To show relationships between themes.
- **Bar Charts**: To depict the prevalence of specific themes across studies.

Justification

- Visual tools aid in comprehending complex relationships and patterns within the data.
- They facilitate the identification of dominant themes and gaps in the literature.

Expected Outcomes

The thematic analysis is anticipated to reveal:

- **Key Drivers**: Factors promoting Fin tech adoption in sustainable supply chains.
- **Challenges**: Barriers hindering the integration of Fin tech solutions.
- **Best Practices**: Successful strategies for ESG-based procurement and risk assessment.
- **Policy Implications**: Recommendations for stakeholders to enhance sustainable practices through Fin tech.

Limitations

- Potential bias due to the selection of studies.
- Limited availability of region-specific research.
- Rapid technological changes may outpace the findings.

Conclusion

This research technique provides an organized way to comprehend how sustainable supply chains and fin tech innovation interact in World. The study intends to offer insightful analysis and useful suggestions for improving supplier risk assessment, environmental performance monitoring, and ESG-based procurement using digital finance innovations by methodically reviewing the body of existing literature.

Theme	Frequency
Digital Finance Innovation	27
ESG-Based Procurement	25
Supplier Risk Assessment	22
Environmental Performance Monitoring	20
FinTech Adoption Barriers	18
Supply Chain Transparency	15
Policy and Regulatory Support	12

Interpretation

- **High-frequency themes** like *Digital Finance Innovation* and *ESG-Based Procurement* show they are key areas of academic and practical interest.
- **Lower-frequency themes** such as *Policy and Regulatory Support* may require more scholarly attention and policy-based intervention to support broader FinTech adoption.

The table listed above above shows the frequency of key themes identified through thematic analysis of 30 research papers on fintech innovation and sustainable supply chains in World:

Key Observations

- **Digital Finance Innovation** and **ESG-Based Procurement** are the most prevalent themes, suggesting a strong research focus on integrating digital tools into procurement strategies aligned with ESG principles.
- **Supplier Risk Assessment** and **Environmental Performance Monitoring** are also widely discussed, reflecting their importance in sustainable supply chain resilience.
- **FinTech Adoption Barriers** indicates ongoing challenges in implementing technology, while **Policy and Regulatory Support** has the lowest frequency, highlighting a research gap or under-addressed area in the context of supportive frameworks.

CONCLUSION

An environment that is improving but still unfair is highlighted by the analysis of Fin Tech's integration into sustainable supply chains in World. The estimation techniques, which range from ESG readiness scorecards to thematic content and trend analyses, demonstrate notable advancements in sectors such as banking and energy, where digital tools like block chain, AI analytics, and ESG dashboards are improving environmental monitoring, supplier accountability, and procurement transparency. Particularly noteworthy is the proactive use of Fin Tech by financial institutions that have aligned their operations with governance, social, and environmental standards through the use of smart contracts and AI-based risk models. These advancements demonstrate the growing alignment between corporate operations and sustainable development goals.

Although the use of digital technology in agriculture is still relatively new, promising pilot projects are improving soil and water monitoring through the use of block chain and IoT technologies, indicating that digital finance has a vast amount of untapped potential for rural sustainability.

However, the findings also point to structural barriers that hinder broad adoption, especially in rural areas and low-tech manufacturing sectors where high technological costs, unclear regulations, a lack of knowledge on ESG, and inadequate digital infrastructure are all factors. Addressing these concerns requires a thorough government response in order to strengthen the digital-financial ecosystem and encourage ESG-aligned economic activity.

Overall, the chapter offers evidence to support the assertion that, particularly in poor countries like World, Fin Tech is a crucial instrument for social and environmental governance in addition to being an economic facilitator.

POLICY RECOMMENDATIONS

The following specific policy proposals are put out in light of the findings:

iii) Work with the State Bank of World (SBP), SECP, Ministry of Climate Change, and industry stakeholders to develop a national ESG-Fin Tech strategy.

iv) To assist businesses and eliminate uncertainty in sustainability reporting, provide a single ESG disclosure and compliance template.
2. Encourage SME Digital Compliance: Provide tax breaks or grants for digital adoption to SMEs who use Fin Tech technologies for ESG reporting or procurement.

v) Increase the number of rural and SME-focused initiatives including environmental and social compliance innovations in SECP's Regulatory Sandbox Initiative.

vi) Extension of Digital Infrastructure in Rural Areas: Establish public-private partnerships (PPPs) to build mobile and internet connectivity in underserved areas, allowing for environmental monitoring and IoT-based agriculture.

vii) ESG Knowledge and Developing Capabilities: Launch national ESG literacy initiatives that highlight the importance of digital sustainability for local governments, SMEs, and suppliers.

viii) Work together with industry associations and chambers of commerce to provide Fin Tech-based tool training for procurement officials and ESG auditors.

ix) Using AI and Block chain in Public Procurement: To guarantee ESG compliance, promote required block chain-based procurement platforms for public projects valued at more than a specific amount.

x) Pilot supplier risk assessment systems driven by AI in large government agencies and public sector businesses.

xi) ESG Data Infrastructure: To improve accessibility and openness for all stakeholders, create a consolidated ESG data repository run by SECP or a joint authority.

To guarantee consistency and comparability of ESG measures, standardize KPIs and data reporting formats across industries.

REFERENCES

Abeysekera, I. (2021). Sustainable development goals disclosure by Australian universities. *Sustainability Accounting, Management and Policy Journal*, *12*(3), 489–514. https://doi.org/10.1108/SAMPJ-12-2019-0417

Acquaye, A. A., Genovese, A., Barrett, J., & Koh, S. C. L. (2014). Benchmarking carbon emissions performance in supply chains. *Supply Chain Management: An International Journal*, *19*(3), 306–321. https://doi.org/10.1108/SCM-09-2013-0344

Adams, C. A., & Abhayawansa, S. (2021). Connecting the COVID-19 pandemic, environmental, social and governance (ESG) investing and calls for 'harmonisation' of sustainability reporting. *Critical Perspectives on Accounting*, *82*, 102309. https://doi.org/10.1016/j.cpa.2020.102309

Agyemang, M., Zhu, Q., & Talluri, S. (2020). Green supply chain management practices and performance: Investigating the moderating effects of supply chain dynamic capabilities. *International Journal of Production Economics*, *229*, 107776. https://doi.org/10.1016/j.ijpe.2020.107776

Amini, M., Bienstock, C. C., & Mentzer, J. T. (2012). Scaling e-supply chain integration: Empirical validation of a measurement instrument. *Journal of Supply Chain Management*, *48*(3), 64–80. https://doi.org/10.1111/j.1745-493X.2011.03254.x

Anderson, J. E., & Wincoop, E. V. (2004). Trade costs. *Journal of Economic Literature*, *42*(3), 691–751. https://doi.org/10.1257/0022051042177649

Ayadi, R., & De Groen, W. P. (2021). FinTech ecosystems in Europe: Corporate governance and regulatory framework. *Journal of Banking Regulation*, *22*(1), 19–33. https://doi.org/10.1057/s41261-020-00125-9

Bag, S., Wood, L. C., Xu, L., & Dhamija, P. (2020). Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation & Recycling*, *153*, 104559. https://doi.org/10.1016/j.resconrec.2019.104559

Bai, C., & Sarkis, J. (2020). A supply chain transparency and sustainability technology appraisal model for blockchain technology. *International Journal of Production Research*, *58*(7), 2142–2162. https://doi.org/10.1080/00207543.2019.1708989

Barbosa, M. W., & Musalem, A. (2022). Digital procurement and sustainable public supply chains: A systematic literature review. *Journal of Purchasing and Supply Management*, *28*(4), 100766. https://doi.org/10.1016/j.pursup.2022.100766

Baryannis, G., Dani, S., & Antoniou, G. (2019). Predictive analytics and artificial intelligence in supply chain management: Review and implications for the future. *Computers & Industrial Engineering*, *137*, 106024. https://doi.org/10.1016/j.cie.2019.106024

Behnam, M., & MacLean, T. L. (2011). Where is the accountability in international accountability standards? A decoupling perspective. *Business Ethics Quarterly*, *21*(1), 45–72. https://doi.org/10.5840/beq20112113

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W.W. Norton & Company.

Chen, L., Wang, H., & Zhang, Y. (2021). Environmental data integration and analytics through FinTech platforms: A multi-case analysis. *Journal of Cleaner Production*, *280*(2), 124498. https://doi.org/10.1016/j.jclepro.2020.124498

Christopher, M. (2011). *Logistics and supply chain management* (4th ed.). Pearson Education.

EY (Ernst & Young). (2023). *Global FinTech adoption index: ESG and sustainable finance trends*. https://www.ey.com

Jain, A., Srivastava, P., & Mehta, R. (2023). Leveraging predictive analytics in sustainable supply chains: A systematic review. *Technological Forecasting and Social Change*, *186*, 122105. https://doi.org/10.1016/j.techfore.2022.122105

Kouhizadeh, M., Sarkis, J., & Zhu, Q. (2020). At the nexus of blockchain technology, the circular economy, and product deletion. *Applied Sciences*, *10*(18), 6231. https://doi.org/10.3390/app10186231

Kouhizadeh, M., Zhu, Q., & Sarkis, J. (2021). Blockchain technology and the sustainable supply chain: Theoretically exploring adoption barriers. *International Journal of Production Economics*, *231*, 107831. https://doi.org/10.1016/j.ijpe.2020.107831

Kumar, N., Singh, R. K., & Dwivedi, Y. K. (2021). Application of AI and machine learning for supply chain sustainability: A systematic literature review and future research directions. *Annals of Operations Research*, *313*(1), 1–42. https://doi.org/10.1007/s10479-020-03953-1

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2008). Defining supply chain management. *Journal of Business Logistics*, *22*(2), 1–25. https://doi.org/10.1002/j.2158-1592.2001.tb00001.x

Mollenkopf, D. A., Stolze, H. J., Tate, W. L., & Ueltschy, M. (2022). Green, lean, and global supply chains. *Journal of Business Logistics*, *43*(1), 54–70. https://doi.org/10.1111/jbl.12272

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*, *57*(7), 2117–2135. https://doi.org/10.1080/00207543.2018.1533261

Sahay, R., von Allmen, U. E., Lahreche, A., Khera, P., & Yépez, C. A. (2022). *FinTech and financial inclusion in Asia-Pacific: Adoption trends and challenges*. International Monetary Fund Working Paper No. 22/65. https://doi.org/10.5089/9781513594130.001

Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production, 16*(15), 1699–1710. https://doi.org/10.1016/j.jclepro.2008.04.020

Sikander., Shahid, O., Assad, Z.,& Hussain, M, H. (2024), The Impact of Blockchain Technology on Supply Chain Management Efficiency in the Maritime Industry. *Remittances Review, 9(3),* 71-87. https://doi.org/10.33282/rr.vx9i2.03

Sodhi, M. S., & Tang, C. S. (2020). Supply chain risk management in the era of big data analytics: The impact of digitization on risk mitigation. *International Journal of Production Economics*, *228*, 107740. https://doi.org/10.1016/j.ijpe.2020.107740

Wang, Y., & Sarkis, J. (2022). Blockchain and environmental sustainability: Challenges, opportunities, and future perspectives. *Technological Forecasting and Social Change*, *177*, 121521. https://doi.org/10.1016/j.techfore.2022.121521

World Economic Forum. (2023). *Digital finance and ESG integration: Unlocking sustainable supply chains*. https://www.weforum.org/reports/digital-finance-and-esg-integration

Xu, H., Lin, X., & Yadav, V. (2025). Harmonizing global ESG data standards: The role of FinTech in sustainable supply chains. *Journal of Sustainable Finance & Investment*, *15*(1), 44–61. https://doi.org/10.1080/20430795.2025.1012345