International Journal of Soft Computing and Engineering (IJSCE)
ISSN: 2231-2307 (Online), Volume-15 Issue-5, November 2025

Smart, Secure, and Connected: A Blockchain-Supported Logistics Ecosystem for Saudi Arabia's 2034 FIFA World Cup

Muath Nasser Aljohani, Abdullah Basiouni

Abstract: ***This research examines how Saudi Arabia might achieve Vision 2030's broad goals while meeting the demands of significant events, such as the 2034 FIFA World Cup, by leveraging high-tech logistics hubs. It examines how supply chain resilience may be enhanced by artificial intelligence (AI) through safety stock, cross-docking for speedy delivery, and intelligent tracking. Using a mixed-methods approach that includes expert interviews, case studies, and performance measurements, the study illustrates how innovations boost productivity, reduce delays, and ensure a smooth flow of commodities. Beyond operations, the study explains how logistics innovation creates avenues for entrepreneurship, supporting start-ups in sustainable transport technology and AI logistics solutions. The study claims that the use of AI, cross-docking, and high-capacity logistics nodes enhances Saudi Arabia's ability to host international logistics events and solidifies its standing as a developing center for supply chain innovation and entrepreneurship.***

Keywords: Logistics Hubs; Artificial Intelligence; Smart Tracking; Safety Stock; Cross-Docking; Land Bridge Project; 2034 FIFA World Cup; Saudi Arabia

Nomenclature:
STS: Smart Tracking Systems
AI: Artificial Intelligence
SMEs: Small-to-Medium-Sized Enterprises

I. INTRODUCTION

The global logistics environment is continually changing due to mega-events, technological disruption, and the growing demands of international trade [1]. According to [2], the revolution in Saudi Arabia is strategically linked to a strategy to diversify the economy, increase industrial capacity, and transform the Kingdom into a worldwide hub of innovation and entrepreneurship. The 2034 FIFA World Cup is both a significant event and an exciting opportunity for Saudi Arabia's logistics sector. Transporting millions of people, goods, and services over long distances requires high levels of resilience and flawless coordination; these circumstances also offer many opportunities for innovation and entrepreneurship [3].

Manuscript Received on 28 October 2025 | Revised Manuscript Received on 04 November 2025 | Manuscript Accepted on 15 November 2025 | Manuscript published on 30 November 2025.
Correspondence Author(s)
Muath Nasser Aljohani, Student, Department of Management Sciences, Yanbu Industrial College, Saudi Arabia, Yanbu. Email ID: aljohani.moath.sa@gmail.com
Prof. Abdullah Basiouni*, Department of Management Sciences, Yanbu Industrial College, Saudi Arabia, Yanbu. Email ID: abasiouni@rcjy.edu.sa, ORCID ID: 0000-0001-5146-0195

This study examines how intensive logistics hubs can boost entrepreneurship and better prepare Saudi Arabia to handle large-scale events. The application of artificial intelligence (AI) to smart tracking, cross-docking to efficient distribution, and safety stock management is the leading facilitator of adaptable, data-driven, and creative supply chains. The Saudi Land Bridge Project, a historic infrastructure project that aims to connect the eastern and western provinces with the rail, is one of the leading enablers of this emerging logistics ecosystem [4].

Future-focused supply chains are indeed possible. Even in the most complex scenarios, artificial intelligence (AI) for demand forecasting and inventory control can save up to 30% in costs, according to a recent study [5]. This represents a significant breakthrough in the field. Intelligent monitoring solutions further reduce losses and ultimately provide organizations with real-time insights into their global operations [6].

A significant, time-consuming event like the World Cup necessitates cross-docking, thereby reducing the need for costly storage and expediting delivery [7]. From an innovation perspective, these mega-events are more than just games; they represent the beginning of new enterprises. They provide business owners with opportunities to develop anything from AI-powered logistics software to more environmentally friendly vehicles. This latest project contributes to Saudi Arabia's Vision 2030, aiming to establish the country as a global leader in supply chain development [8, 2].

II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The two key literary streams that underpin this theoretical framework are the adoption of innovation in supply chain management and the role of entrepreneurship in economic growth. The traditional linear, segmented, and reactive logistics methods cannot manage the complexity and volatility of the modern global economy. The deployment of Smart Tracking Systems (STS) is a crucial step toward transparency, visibility, and proactive management, according to [6]. In addition to reducing uncertainty, these technologies enable more inventive and adaptable logistics, such as customised and on-demand services, which add value in cutthroat marketplaces.

It is essential to consider how cross-docking has evolved beyond its initial use as a distribution shortcut. As [7] point out, cross-docking is a process innovation that reduces unnecessary handling, minimises inventory management costs, and increases throughput. This strategy is entrepreneurial because it seeks to reduce inefficiencies, restructure resource flows, and deliver greater value to end users. Similarly, the deployment of safety stock is being reconsidered as a proactive

risk-reduction technique rather than a passive cost burden in more innovation-focused literature. Because it can guarantee a steady and uninterrupted supply chain, safety stock is a competitive advantage, especially for logistics companies and startups operating in the high-stakes environment of mega-events.

These global understandings become somewhat relevant in the Saudi Arabian setting. One of the most dramatic examples of how macro-level infrastructure can encourage micro-level innovation and entrepreneurship is the Saudi Land Bridge Project, which intends to connect the Kingdom's eastern and western regions. These activities will help logistics startups and SMEs enter the market and increase national competitiveness by eliminating operational obstacles and establishing new market linkages [4].

This collection of studies shows a confluence of physical (logistics hubs, the Land Bridge, etc.) and digital (AI, STS, and advanced process innovations) technologies. An entrepreneurial logistics workplace aligned with business expertise and the overarching economic objective is enabled by integration. It also emphasizes how significant occasions, such as the FIFA World Cup in 2034, may promote innovation and offer business prospects for Saudi Arabia's logistics sector.

Blockchain technology has also emerged as a transformative tool within global supply chains, particularly for enhancing transparency, traceability, and data integrity [11]. Emphasize that blockchain enables immutable, decentralized record-keeping that prevents data manipulation and strengthens trust among logistics partners. At large-scale events such as FIFA tournaments, blockchain can verify shipment authenticity, verify supplier compliance, and prevent counterfeit or unverified materials from entering the logistics network. Its integration with AI and innovative tracking systems further enhances real-time visibility, creating a secure digital infrastructure for managing high-volume, time-sensitive flows.

In the context of Saudi Arabia's World Cup preparations, blockchain's potential role aligns with the global trend of incorporating secure digital platforms to reinforce resilience and accountability across supply chains. Although not yet widely implemented in Saudi logistics operations, the technology's theoretical relevance is consistent with other digital transformation enablers discussed in this research.

III. MATERIALS AND METHODS

This study employs a mixed-methods assessment to explore how advanced technology and intensive logistics facilities can enhance Saudi Arabia's logistical readiness to host major events such as the FIFA World Cup in 2034. By drawing on supply chain management literature, the research integrates both quantitative and qualitative research designs [5, 9].

A. Qualitative Data Collection

Semi-structured interviews were conducted with 15 logistics specialists and key stakeholders, including the Saudi Land Bridge Project and the World Cup preparation committees. Views on AI-based logistics solutions, the opportunities and barriers to entrepreneurship, and the present barriers to innovation were all discussed in these interviews. It was then contrasted with global best practices, such as the deployment of technology to lessen logistical surges at the World Cup mega-event in Qatar in 2022. These case studies were further tailored to Saudi Arabia's infrastructure and geography [10].

B. Quantitative Data Collection

To determine the extent to which AI, intelligent tracking systems (STS), cross-docking, and safety stock procedures are used, a survey of 50 Saudi Arabian supply chain experts was conducted. Key performance metrics were gathered and modelled both before and after technology integration, including delivery times, operational costs, inventory turnover, and lost product rates.

C. Data Analysis

Qualitative data from interviews were transcribed and thematically classified to find common trends in innovation adoption and entrepreneurial facilitators. Using quantitative data and descriptive and inferential statistical methods, regression modelling was employed to assess the connection between efficiency improvements and technology adoption [11]. The confidentiality and anonymity of participant responses were considered ethical protections. This approach is consistent with recent systematic evaluations that emphasize the importance of AI in building robust and creative supply chains, as well as referring to Vision 2030 measures that promote entrepreneurship and startup-friendly settings [10].

IV. RESULTS AND DISCUSSION

A. Key Findings on Logistical Performance

The study's empirical findings show how new technologies may revolutionize logistical operations, which are essential for planning a significant event like the 2034 FIFA World Cup. The use of the specific innovations resulted in a notable quantitative change in the primary performance measures:

i. *AI Application:* Operational efficiency increased by 35% through AI-driven predictive analytics and dynamic route optimisation. The significant reduction in delays and improved resource allocation, also seen internationally in the context of innovative supply chain management, have made this possible in part [5]. This is particularly important because supplies must travel over a significant area of Saudi Arabia and arrive in each host city on schedule.

ii. *Smart Tracking Systems (STS):* A 40% reduction in lost or missing items was directly linked to the use of STS via IoT. This supply chain visibility and real-time asset monitoring significantly increase accountability and transparency. This type of management is crucial in high-stakes event logistics, where the timely delivery of supplies to stadiums, broadcast equipment, and hospitality goods is a non-negotiable.

iii. *Cross-Docking:* A 25% reduction in storage time has been achieved through cross-docking techniques during the logistics hub design phase. The strategy also boosts throughput, lowers the cost of keeping inventory, and encourages the short distribution cycles required to adhere to a strict event schedule. This aligns with studies that view cross-docking as one of the elements driving a distribution system that is more resilient and flexible [7].

B. Cultivating an Ecosystem for Innovation and Entrepreneurship

The findings are more than simply statistics; they signify a shift in Saudi logistics' operational philosophy that fosters creativity and entrepreneurial pursuits. AI reduces the entrance hurdle for agile startups and small-to-medium-sized enterprises (SMEs) by increasing productivity by 35%. By providing specialized, data-driven logistics solutions that don't require such a significant initial capital commitment, these entrants may compete with more established businesses. They may accomplish this by making use of cloud-based AI systems, which are an excellent illustration of disruptive innovation.

Similarly, the 40% increase in asset monitoring reduces a fundamental operating risk. This reduction in losses has made the logistics sector a safer and more attractive venture for venture capital and entrepreneurial activity. It enables new business models that want to transport high-value, high-security event-related goods. Additionally, this 25% decrease in storage duration shows a shift away from inventory ownership and toward an asset-light, speed-oriented, flexible business approach. This aspect of the entrepreneurial approach could enable new companies to expand and change [7].

The physical foundation of this new ecosystem is the Land Bridge Project, which created an indivisible national market that necessitates such innovative solutions. Vision 2030 seeks to achieve this macro-infrastructural-micro level technological innovation synergy through the expansion and diversification of the private sector. The need to host the FIFA World Cup in 2034 is a significant market push that will generate high visibility, quick, and pressing demand for business endeavours that can provide the required worldwide logistical preparedness. This ecosystem encourages innovation in related areas, such as sustainable packaging and green logistics, and supports entrepreneurs developing predictive AI apps to advance the event's environmental goals.

An additional technology that complements AI and smart tracking is blockchain, which can strengthen logistical transparency and verification during mega-events. For the 2034 World Cup, blockchain-enabled tracking could authenticate supplier records, verify temperature-controlled shipments, and prevent documentation errors during cross-country movement facilitated by the Land Bridge. While this study's core focus remains on AI, smart tracking, and cross-docking, blockchain represents a natural extension of these technologies, supporting secure data exchange and reducing operational risks.

V. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

According to the current study, integrating AI, intelligent monitoring, and cross-docking into logistics in the Saudi Arabian market represents a paradigm shift rather than a mere improvement over current practices. This is critical for hosting a significant event such as the FIFA World Cup in 2034 and, more importantly, for meeting Vision 2030's broader economic ambitions.

There is solid evidence that the Land Bridge Project's upgraded technologies significantly increase disruption tolerance and efficiency. Furthermore, they provide a creative environment that encourages the growth of SMEs and enables the use of innovative logistics technology. Traditional procedures, such as safety stock, are being recast as risk management instruments.

Future studies must examine the specific business models that emerge from such an ecosystem, how to deploy this technology in other relevant sectors, such as e-commerce, and the legal framework required to enable such growth and serve as a model for different economies. Further, exploring the integration of blockchain with AI-based logistics systems to assess how decentralized data validation can enhance transparency, reduce fraud, and support secure coordination across the multi-stakeholder supply chain required for mega-events can be investigated too.

ACKNOWLEDGEMENTS

The authors would like to thank Yanbu Industrial College and the Royal Commission of Yanbu for their crucial advice and support throughout the study.

DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted with objectivity and without any external influence.
- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate ethical approval or consent to participate with supporting documentation.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

REFERENCES

1. Nicoletti, B. (2025). AI transformation of logistics. In Artificial intelligence for logistics 5.0: From foundation models to agentic AI (pp. 107–131). Cham: Springer Nature Switzerland. DOI: https://doi.org/10.1007/978-3-031-94046-0_2
2. Saudi Vision 2030. (2025). Overview. https://www.vision2030.gov.sa/
3. Chan, H. K., Cheng, Y., Shi, Y., & Sheng, J. (2025). Guest editorial: Platform-enabled supply chain and logistics excellence: Research challenges and opportunities. International Journal of Physical Distribution & Logistics Management, 55(6), 569–581. DOI: https://doi.org/10.1108/IJPDLM-07-2025-561
4. Alotaibi, F. J. (2022). Cost-benefit analysis of the Saudi Land Bridge Project (No. AFITENSMS22S054). https://apps.dtic.mil/sti/trecms/pdf/AD1181252.pdf
5. 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. DOI: https://doi.org/10.1016/j.jbusres.2020.09.009
6. Mohsen, B. M. (2023). Developments of digital technologies related to supply chain management. Procedia Computer Science, 220, 788–795. DOI: https://doi.org/10.1016/j.procs.2023.03.105
7. Kiani Mavi, R., Goh, M., Kiani Mavi, N., Jie, F., Brown, K., Biermann, S., & Khanfar, A. A. (2020). Cross-Docking: A systematic literature review. Sustainability, 12(11), 4789.

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

https://www.mdpi.com/2071-1050/12/11/4789#
8. Offiong, U. P., Szopik-Depczyńska, K., & Ioppolo, G. (2025). FinTech innovations for sustainable development: A comprehensive literature review and future directions. Sustainable Development. https://onlinelibrary.wiley.com/doi/abs/10.1002/sd.70068
9. Baryannis, G., Validi, S., Dani, S., & Antoniou, G. (2019). Supply chain risk management and artificial intelligence: State of the art and future research directions. International Journal of Production Research, 57(7), 2179–2202. DOI: https://doi.org/10.1080/00207543.2018.1530476
10. Riahi, Y., Saikouk, T., Gunasekaran, A., & Badraoui, I. (2021). Artificial intelligence applications in supply chain: A descriptive bibliometric analysis and future research directions. Expert Systems with Applications, 173, 114702. DOI: https://doi.org/10.1016/j.eswa.2021.114702
11. Treiblmaier, H., & Rejeb, A. (2023). Exploring blockchain for disaster prevention and relief: A comprehensive framework based on industry case studies. Journal of Business Logistics, 44(4), 550–582. DOI: https://doi.org/10.1111/jbl.12345

AUTHOR'S PROFILE

Mr. Muath Nasser Aljohani is a final-year bachelor's degree student in Supply Chain Management at Yanbu Industrial College. He is highly passionate about logistics and supply chain management, and he continuously strives to advance the field through ongoing learning and academic engagement. His interests focus on enhancing operational efficiency and supporting innovation within modern industrial systems. He is also involved in football-related research activities, particularly those that connect sports management with contemporary supply chain strategies. He consistently works to expand his knowledge and develop his skills, preparing himself for a distinguished professional career in this field.

Prof. Abdullah F. Basiouni is a full Professor of E-Commerce at Yanbu Industrial College, Saudi Arabia. He holds a B.S. in Management Information Systems (MIS) from KFUPM, an M.S. in E-Commerce from Dalhousie University, and a Ph.D. in Management of Technology from the University of Waterloo, Canada. Prof. Basiouni is active in e-commerce and digital business enablement, supply chain management, and artificial intelligence. He has contributed to projects involving accreditation (ACBSP, ABET) and professional collaborations (CILT, SOCPA), as well as consultancy work.