


# Chapter 13

## Green Logistics 5.0: An Examination of Innovation Driven by Sustainability Using Foundation Models in Logistics

**Ankit Garg**


 <https://orcid.org/0000-0003-4558-8074>

*Ajay Kumar Garg Institute of Management, India*

**Ruchika Nayyar**


*Amity Business School, Amity University, Noida, India*

**Surabhi Singh**

 <https://orcid.org/0000-0002-8565-7348>


*G.L. Bajaj Institute of Management and Research, India*

**Himanshu Sharma**

 <https://orcid.org/0009-0009-7905-1145>

*Ajay Kumar Garg Institute of Management, India*

**Rahul Singhal**

 <https://orcid.org/0000-0002-2672-8521>

*Ajay Kumar Garg Institute of Management, India*

### ABSTRACT

*This chapter investigates how foundation models might be incorporated into Logistics 5.0 to support a green strategy that fosters sustainability and long-term financial viability. Through the use of foundation models, the study seeks to improve social responsibility, guarantee sustainable innovation, and organize the environmental framework of the logistics sector. The company ideology, products, processes, and*

DOI: 10.4018/979-8-3373-2434-0.ch013

*business models are all included in the multi-layered approach, which emphasizes sustainability-oriented innovation (SOI) as a need rather than just a tactic. According to the results, artificial intelligence—in particular, foundation models can achieve social, economic, and governance goals while optimizing a range of logistical processes, such as route planning, packaging reduction, and warehouse management.*

## **INTRODUCTION**

Since logistics contributes significantly to environmental deterioration, finding creative, sustainable solutions is crucial. It is more important than ever to strike a balance between sustainability and efficiency as supply networks grow more intricate and international. The adoption of foundation models, which use machine learning techniques, artificial intelligence, and predictive analytics to optimize logistics processes while lowering their environmental effect, is one viable alternative. The incorporation of FMs into Logistics 5.0 is consistent with the industry 5.0 paradigm, which emphasizes intelligent, sustainable, and human-centric systems. To create a more environmentally friendly logistics environment, this study investigates how FMs might improve warehouse productivity, reduce packaging waste, and optimize shipping routes. Organizations may greatly reduce waste generation, increase the accuracy of demand forecasting, and reduce their carbon footprint by utilizing these cutting-edge AI-driven models. This will ultimately promote a more accountable and resource efficient supply chain.

Beyond just improving the environment, the use of FMs in logistics also increases operational effectiveness, reduces expenses, and boosts customer happiness. The study emphasizes a multifaceted strategy that combines business models, operational procedures, product development, and corporate philosophy to emphasize the vital role that sustainability-oriented innovation (SOI) plays in logistics. In order to provide a more effective and responsible supply chain, FMs help businesses at the operational level minimize energy use, recommend environmentally friendly recycling practices, and produce predictive insights for product returns. To cut down on needless fuel use and emissions, AI-powered route optimization algorithms, for example, can dynamically modify transportation schedules based on real-time traffic data, meteorological conditions, and fuel efficiency metrics. In a similar vein, companies can reduce overproduction and excessive storage costs by using machine learning-based demand forecasting models to match production and inventory management with real market demand. By lowering inefficiencies and encouraging a circular economy, these enhancements not only support sustainability but also increase the supply chains' overall resilience.

28 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: [www.igi-global.com/chapter/green-logistics-50/386053](http://www.igi-global.com/chapter/green-logistics-50/386053)

## Related Content

---

### Broad Perspective of Smart Home Technology in 2024

Joseph M. Schulz and Jack S. Scilla (2024). *International Journal of Smart Technologies* (pp. 1-27).

[www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186](http://www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186)

### Broad Perspective of Smart Home Technology in 2024

Joseph M. Schulz and Jack S. Scilla (2024). *International Journal of Smart Technologies* (pp. 1-27).

[www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186](http://www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186)

### Broad Perspective of Smart Home Technology in 2024

Joseph M. Schulz and Jack S. Scilla (2024). *International Journal of Smart Technologies* (pp. 1-27).

[www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186](http://www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186)

### AI-Driven Decision Making Enhancing Public Sector Efficiency and Effectiveness

Karthik Raja Srinivasan, Nur Hairani Abd Rahman and Sri Devi Ravana (2025). *Harnessing AI, Blockchain, and Cloud Computing for Enhanced e-Government Services* (pp. 63-92).

[www.irma-international.org/chapter/ai-driven-decision-making-enhancing-public-sector-efficiency-and-effectiveness/367016](http://www.irma-international.org/chapter/ai-driven-decision-making-enhancing-public-sector-efficiency-and-effectiveness/367016)

### GANS and Meta-Learning: Identifying Key Challenges and Uncovering Limitations in AI Research

Munish Kumar (2025). *Exploring Generative Adversarial Networks and Meta-Learning Synergies* (pp. 193-214).

[www.irma-international.org/chapter/gans-and-meta-learning/375561](http://www.irma-international.org/chapter/gans-and-meta-learning/375561)