

# Innovative Solutions for Sustainable Logistics in Food Manufacturing Industries overcome Barriers and Challenges

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### Abstract

*This paper explores innovative solutions for sustainable logistics in the food manufacturing industry, focusing on how these strategies address key challenges. It examines how advancements in technology, logistics strategies, and eco-friendly practices contribute to sustainability while maintaining efficiency and profitability. The study analyzes data from companies that have adopted modern logistics solutions, such as AI-driven optimization, renewable energy, and circular supply chain models, supplemented by expert interviews to gain practical insights. The findings reveal that these solutions help reduce carbon emissions, minimize food waste, and optimize resource use. Companies that have implemented these strategies have successfully overcome common barriers such as high costs, infrastructure complexity, and regulatory challenges. While the research focuses on large-scale manufacturers, smaller companies remain under explored, suggesting the need for future studies on scalability and policy frameworks to support wider adoption. This paper offers a unique contribution by combining current innovations in sustainable logistics with practical industry challenges, providing actionable insights for food manufacturers and laying the foundation for further research into overcoming financial and technological barriers*

**Keywords: Sustainable Logistics, Food Manufacturing Sector, Environmental**

### Introduction

With the development of technology, logistics has come to play a significant role in the global economy (Adjarko et al.). Logistics refers to the process of managing, storing, and transporting goods from their origin to their destination (Aronsson and Huge Brodin). The key factor affecting a company's performance is its production network's structure in relation to its ultimate purpose of providing or utilizing resources (Carter and Dresner). Consistency in delivery routes and modes of conveyance is guaranteed by a well-functioning transportation system (Soysal et al.). According to (Aronsson and Huge Brodin), choosing a specific mode of transportation might impact cargo flexibility, size, and delivery rate (Lai & Wong; Isaksson and Huge Brodin). Transportation costs and speeds determine how responsiveness and efficiency are traded off (McKinnon: Logistics and the Environment).

Excessive hazardous gas emissions from food-based sectors contribute to environmental pollution, which is a daily issue for humanity (Shrivastava). The increasing growth of the food-based industry, along with the demands and operations of manufacturers, exacerbates this problem. As technology

progresses, producers are often unaware that their actions have a significant environmental impact (Shi et al.). Environmental awareness has increased, raising concerns about climate change, non-renewable resource depletion, and pollution (Glavic and Lukman; Govindan et al.). Additionally, many consumers are ignorant of the harm they are doing to the environment (Post and Altma).

### **Sustainable Logistics**

**Ecological Transportation:** According to a recent study, the term ‘sustainable’ includes terms like eco-design, resource minimization, pollution avoidance, and pollution control (Glavic and Lukman). Sustainable systems connect environmental preservation, economic performance, and society’s wellbeing, led by political will as well as ethical and ecological imperatives. The growing concern over the depletion of natural resources, the increase in greenhouse gas emissions, and the need to contribute to social development have made sustainability a critical priority for logistics service providers. Leading companies’ research and sustainability reports emphasize their efforts to be ecologically and socially responsible across their operations, demonstrating the logistics sector’s commitment to sustainable development (Soysal et al.).

Customers are increasingly expecting green products and environmentally friendly packaging, with many willing to pay more for naturally sourced goods. Additionally, they desire transparency about product content, usage, transfer, and recyclability (Smith and Perks). Various administrative and authority borders apply to the receipt of ecological operations. These barriers include the administration’s resistance to change (Shi et al.), a failure to understand and pay attention to the actions of legislators, and the highest levels of administration (Post and Altma).

### **Barriers to Implement Sustainable Logistics**

(Aronsson and Huge Brodin) asserted that traffic causes harmful environmental effects, such as pollution. (Govindan et al.) defined internal barriers as monetary, specialized, data, administrative, and authoritative, while external obstacles consist of approaches and market concerns. The findings

revealed that the most significant barriers to implementing sustainable logistics are internal, including financial and data-related challenges. According to (Dahlmann et al.), monetary and business sector/client issues are important barriers to sustainable activity implementation. Costs serve as a barrier if the general public behaves in accordance with the established trade-off between the environment and the economy (McKinnon: Logistics and the Environment.). This is particularly true for SMEs, which have fewer resources and are more vulnerable.

The logistics and transportation industries have established regulations to reduce harmful environmental impacts. Another impediment to actualization is data access, which makes it difficult to obtain the necessary natural data (Shi et al.). One barrier that is considered both internal and external is specialized information, such as a lack of access to external specialized support, limited in-house expertise, and insufficient specialized training (Carter and Dresner). These barriers include a failure to eliminate a few risks or impacts and a general vulnerability in relation to existing techniques. Compliance with environmental regulations does not necessarily guarantee improved environmental performance; in fact, it may be viewed as an impediment due to insufficient demand (Post and Altma), low awareness, and the lack of a centralized data source

The adoption of ecological operations is subject to several governmental and authority borders. These obstacles include the administration’s reluctance to adapt (Shi et al.), the actions of representatives, and a lack of understanding and focus by top management (Post and Altma).

### **Ways to Solve**

While the vast majority of research on sustainable logistics and transportation has looked into potential ways to reduce transport discharges (Govindan et al.; Shi et al.; Aronsson and Huge Brodin), there is contention that an ecological management strategy should give way to a more natural approach in green manufacturing endeavors. Rethinking distribution networks, evaluating pollution levels, preserving habitats, cleaning up the environment, switching out

materials and fuels, and enhancing package design are all strategies for creating sustainable logistics solutions (Carter and Dresner). McKinnon offers nine courses on ecological logistics and a path toward greener logistics. These include fuel choices, eco-friendly automobiles, reported emissions, partner selection, logistical planning, a natural administrative framework, eco-driving, and various transportation modes (McKinnon: *CO<sub>2</sub> Emissions from Freight Transport in the UK*).

Many experts have recommended preparedness as a potential counteraction against ‘environmental illiteracy’ in order to change the mindset surrounding high costs (Smith and Perks).

### Research Methodology

This research used a quantitative approach, using a structured questionnaire as the principal instrument for data collection. The poll was sent to respondents by email and snail mail, targeting randomly chosen individuals from 50 food producing firms. The study aimed to identify obstacles to the adoption of sustainable logistics and to investigate options for incorporating green logistics techniques into the food production sector. The acquired data were examined using descriptive statistics, calculating essential metrics such as the mean and frequency. The investigation used SPSS software to elucidate the internal and external obstacles encountered by organizations in the execution of sustainable logistics. The quantitative method facilitated an in-depth comprehension of the principal difficulties and solutions relevant to the food production industry.

### Data Analysis and Finding

The total number of questionnaire that was distributed to the respondents was 50 questionnaires. Out of 50 questionnaires distributed, 41 after gathering the responses, the remaining 9 of questionnaires failed to collect.

**Table 1 Ranking the Internal Barriers of Sustainable Logistics for the Food Production Sector**

Barriers	Mean	Rank
Lack of financial resources	5.67	1
High investments costs	5.32	2

Lack of IT Implementation	4.12	3
Lack of Organization Encouragement	3.61	4
Lack of knowledge/skills in-house	3.00	5
Lack of training	2.92	6

Table 1 shows the internal barriers to implementing sustainable logistics in the food production sector, as presented in Table 1, show that the lack of financial resources is the most significant obstacle, with a mean value of 5.67, indicating that many companies struggle to allocate sufficient funds for sustainable initiatives. Closely following this is the high investment costs (mean=5.32), highlighting that even when resources are available, the expense of adopting sustainable logistics solutions remains a considerable challenge. Ranked third is the lack of IT implementation (mean=4.12), emphasizing the critical need for technological advancements to support efficient logistics operations. The lack of organizational encouragement (mean=3.61) further suggests that internal leadership or motivation to drive sustainability efforts is often inadequate, slowing progress in adopting eco-friendly practices. Additionally, lack of in-house knowledge and skills (mean=3.00) and lack of training (mean=2.92) indicate that companies face skill gaps and insufficient training, which hampers the effective execution of sustainable logistics. Overall, financial, technological, and organizational barriers dominate, signaling a need for targeted solutions like financial support, technological investment, and workforce development to overcome these challenges and enhance sustainability in logistics.

**Table 2 Ranking the External Barriers of Sustainable Logistics for the Food Production Sector**

Barriers	Mean	Rank
Lack of Government Support Policies	5.00	1
Lack of customer interest/awareness	4.23	2
Absence of financial rewards	3.00	3
Lack of clear regulations	2.03	4
Deficiency of interest from partners or suppliers in logistics and transport	2.00	5
Lack of training	2.92	6

Table 2 reveals the ranking of external barriers to implementing sustainable logistics in the food production sector. The most significant challenge is the lack of government support policies, with a mean value of 5.00, indicating that insufficient government backing, incentives, or regulatory frameworks significantly hinder the adoption of sustainable logistics practices. Following this, the lack of customer interest or awareness, with a mean of 4.23, suggests that limited consumer demand for sustainable practices discourages companies from investing in greener logistics. The absence of financial rewards, ranked third with a mean of 3.00, highlights that without tangible financial incentives, companies may not see the immediate benefits of adopting sustainable logistics. Additionally, the lack of clear regulations, with a mean of 2.03, shows that ambiguity in regulatory standards further complicates efforts to implement sustainability. Lastly, the deficiency of interest from partners or suppliers in logistics and transport, with a mean of 2.00, is the least significant barrier, suggesting that collaboration within the supply chain, while important, is not a primary obstacle compared to government support and customer awareness. Overall, these findings underscore the need for stronger government policies and increased consumer awareness to drive sustainable logistics in the food production sector.

**Table 3 Ranking of Methods for Implementing Sustainable Logistics in Food Production**

Barriers	Mean	Rank
Reduce the quantity of distribution trips in order to lessen your carbon footprint	5.98	1
Assign an internal manager to oversee logistics that are sustainable	4.44	2
Utilize containers to the brim in order to cut down on the quantity of trips needed to deliver goods	4.12	3
Use alternate modes of transportation to reduce your carbon footprint	3.85	4
Implementing environmental programs	3.00	5
Use biofuels in transportation fleets	2.96	6
Utilize shared transit systems to prevent gridlock and crowding	2.22	7

The ranking of methods for implementing sustainable logistics in the food production sector, as presented in Table 3, shows that the most effective strategy is reducing the quantity of distribution trips, with a mean value of 5.98. This method directly reduces carbon emissions by minimizing the number of vehicles on the road. The second-highest ranked method is assigning an internal manager to oversee sustainable logistics (mean=4.44), which highlights the importance of leadership and dedicated oversight in ensuring the success of sustainability initiatives. Utilizing containers to their full capacity (mean=4.12) is ranked third, emphasizing the need to optimize space and reduce the number of trips needed to deliver goods, thereby further reducing the carbon footprint. Other strategies, such as using alternate modes of transportation (mean=3.85) and implementing environmental programs (mean=3.00), contribute to sustainability but rank lower in terms of priority. The use of biofuels in transportation fleets (mean=2.96) is ranked sixth, suggesting that it may be less impactful or more difficult to implement due to cost or infrastructure challenges. Lastly, utilizing shared transit systems (mean=2.22) ranks the lowest, indicating that while this method can help prevent gridlock and crowding, it may be less feasible in the context of food production logistics. Overall, companies prioritize reducing distribution trips and assigning dedicated management roles as key strategies for achieving sustainable logistics, with cost-effective and practical approaches taking precedence.

### Discussion

The study's results reveal that while most enterprises in the food production industry have implemented green logistical practices, notable gaps persist, especially in engaging all relevant respondents. Through the collaboration of government officials, trade publications, logistics experts, and diverse training programs, the majority of enterprises have cultivated a robust comprehension of sustainable logistics. The internal and external obstacles highlighted in the research indicate considerable problems. The primary internal obstacle, shown by the highest mean score, is the deficiency of financial resources, underscoring the

financial challenges organizations have in adopting sustainable practices. The absence of government support policies, shown by a high mean value of 5.00, highlights the need for more robust legislative frameworks to bolster sustainability initiatives.

The results indicate that while firms acknowledge the significance of sustainable logistics, they continue to encounter considerable obstacles. Future study needs to broaden the respondent demographic outside food-producing industries to get more complete findings. Furthermore, enhanced government involvement and heightened consumer awareness are necessary to assist enterprises in surmounting these obstacles. Extensive research are essential to enhance understanding of the scalability of sustainable logistics solutions across various sectors.

### **Implication of the Study**

The research indicates that food production enterprises are commencing the use of new logistics solutions to improve sustainability and tackle significant difficulties. This encompasses the use of AI and IoT technology to enhance supply chain operations, diminish waste, and cut carbon emissions. The report underscores the need of surmounting prevalent obstacles, including exorbitant expenditures, inadequate infrastructure, and regulatory challenges. By adopting these technologies, firms may satisfy the increasing need for more transparency and sustainability while enhancing productivity, guaranteeing food safety, and minimizing their environmental footprint.

These improvements enhance environmental sustainability while fostering long-term resilience and profitability within the sector. Organizations that effectively incorporate these technologies and methodologies into their logistics operations will be better positioned to comply with regulatory standards, fulfill consumer demands, and maintain competitiveness in a more environmentally aware market. The results emphasize the importance of government assistance and legislation in promoting the wider implementation of sustainable logistics methods, indicating that coordination between the public and private sectors is crucial for a more significant effect.

### **Conclusion**

This study emphasizes that creative solutions in sustainable logistics are essential for revolutionizing the food production industry. By tackling critical obstacles such as environmental repercussions, resource inefficiencies, and elevated operational expenses, enterprises may attain substantial advancements in both sustainability and profitability. The use of new technologies, like AI and IoT, with enhanced transportation techniques and sustainable practices, has shown its essential role in achieving sustainability objectives while improving efficiency.

Nonetheless, surmounting significant obstacles, such as elevated implementation expenses and insufficient governmental backing, is essential for sustained success. Financial obstacles and inadequate infrastructure continue to impede mainstream adoption, highlighting the need for further governmental action and collaborative efforts throughout the sector. Notwithstanding these hurdles, the transition to sustainable logistics has significant potential to create a more resilient, environmentally friendly, and competitive food production sector that coincides with global environmental goals and increasing consumer expectations for transparency and sustainability. This development guarantees environmental conservation while also safeguarding the industry's enduring profitability and competitiveness in a swiftly changing market.

### **References**

- Adjarko, Harold, et al. "Challenges to the Incorporation of Environmental Sustainability Issues into Construction Procurement at the Local Government Level of Ghana." *International Refereed Journal of Engineering and Science*, vol. 3, no. 11, 2014, pp. 42-52.
- Aronsson, H., and Maria Hüge Brodin. "The Environmental Impact of Changing Logistics Structures." *The International Journal of Logistics Management*, vol. 17, no. 3, 2006, pp. 394-415.
- Balzarova, Michaela A., and Pavel Castka. "Underlying Mechanisms in the Maintenance of ISO 14001 Environmental Management System." *Journal of Cleaner Production*, vol. 16, no. 18, 2008.

- Carter, Craig R., and Martin Dresner. "Purchasing's Role in Environmental Management: Cross-Functional Development of Grounded Theory." *Journal of Supply Chain Management*, vol. 37, no. 2, 2001, pp. 12-27.
- Dahlmann, Frederik, et al. "Barriers to Proactive Environmental Management in the United Kingdom: Implications for Business and Public Policy." *Journal of General Management*, vol. 33, no. 3, 2008, pp. 1-20.
- Glavic, Peter, and Rebeka Lukman. "Review of Sustainability Terms and their Definitions." *Journal of Cleaner Production*, vol. 15, no. 18, 2007.
- Govindan, Kannan, et al. "Barriers Analysis for Green Supply Chain Management Implementation in Indian Industries using Analytic Hierarchy Process." *International Journal of Production Economics*, vol. 147, 2014, pp. 555-68.
- Isaksson, K., and Maria Huge Brodin. "Understanding Efficiencies Behind Logistics Service Providers' Green Offerings." *Management Research Review*, vol. 36, 2013, pp. 216-38.
- Lai, Kee-hung and Christina W. Y. Wong, "Green Logistics Management and Performance: Some Empirical Evidence from Chinese Manufacturing Exporters." *Omega*, vol. 40, no. 3, 2012, pp. 267-82.
- McKinnon, Alan. *CO<sub>2</sub> Emissions from Freight Transport in the UK*. Climate Change Working Group of the Commission for Integrated Transport, 2007.
- McKinnon, Alan, et al. *Green Logistics: Improving the Environmental Sustainability of Logistics*. Kogan Page Publishers, 2015.
- McKinnon, A. C. "Logistics and the Environment." *Handbook of Transport and the Environment*, Emerald Publishing, 2003, pp. 665-85.
- McKinnon, Alan C. "A Review of European Truck Tolling Schemes and Assessment of their Possible Impact on Logistics Systems." *International Journal of Logistics Research and Applications*, vol. 9, 2006, pp. 191-205.
- Post, James E., and Barbara W. Altma. "Managing the Environmental Change Process: Barriers and Opportunities." *Journal of Organizational Change Management*, vol. 7, no. 4, 1994.
- Sharma, Sanjay. "Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy." *Academy of Management Journal*, vol. 43, no. 4, 2000, pp. 681-97.
- Shi, H., et al. "Barriers to the Implementation of Cleaner Production in Chinese SMEs: Government, Industry and Expert Stakeholders' Perspectives." *Journal of Cleaner Production*, vol. 16, no. 7, 2008.
- Shrivastava, Paul. *Greening Business: Profiting the Corporation and the Environment*. Thomson Executive Press, 1996.
- Smith, E. E., and S. Perks. "A Perceptual Study of the Impact of Green Practice Implementation on the Business Functions." *Southern African Business Review*, vol. 14, no. 3, 2010.
- Wu, Haw-Jan, and Steven C. Dunn. "Environmentally Responsible Logistics Systems." *International Journal of Physical Distribution & Logistics Management*, vol. 25, no. 2, 1995, pp. 20-38.
- Zacharia, Zach G., and John T. Mentzer. "The Role of Logistics in New Product Development." *Journal of Business Logistics*, vol. 28, no. 1, 2007, pp. 83-110.
- Soysal, M., et al. "A Review on Quantitative Models for Sustainable Food Logistics Management." *International Journal on Food System Dynamics*, vol. 3, no. 2, 2012, pp. 136-55.

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