International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 248-252 www.ijaem.net ISSN: 2395-5252

Challenges and Opportunities in Implementing Green Supply Chain Management: an Investigation into Malaysia's Freight Forwarding Industry

Dr Vijayakumaran Kathiarayan
International Institute of Applied Science of Swiss School of Management, Bellinzona, Switzerland and Dr Sundarapandiyan, Professor, DoMS, Adithya Institute of Technology, Coimbatore, India

Date of Submission: 10-09-2023 Date of Acceptance: 20-09-2023

ABSTRACT
This study investigates the role of supply chain management in enhancing environmental performance among freight forwarders, focusing on the case of Malaysia. Despite the critical nature of their services to international trade, freight forwarders have been linked to various environmental issues including pollution, hazardous waste, and greenhouse gas emissions. Through an in-depth analysis, this research aims to shed light on how freight forwarders can implement green supply chain practices to improve environmental performance, while also maintaining operational efficiency. It also addresses the challenges and uncertainties that freight forwarders face in their transition to greener operations.

Keywords: Freight Forwarders, Supply Chain Management, Environmental Performance, Green Supply Chain, Malaysia, Sustainability, Operational Efficiency, Pollution, Hazardous Waste

I. INTRODUCTION

1.0 Introduction

In the modern global economy, freight forwarders serve as essential intermediaries in international trade, facilitating the movement of goods across borders. While their services bring considerable benefits to manufacturers and consumers, they also contribute to various environmental challenges. In particular, logistics and fleet management in the freight forwarding industry have been implicated in oil spills, air pollution, and waste management issues. This research aims to study and investigate how the application of supply chain management impacts the environmental performance of freight forwarders, with a specific focus on the Malaysian context.

1.1 Research Background

Freight forwarding is an integral part of global commerce, offering services ranging from import/export management to transportation logistics (Huang et al., 2019). Particularly in Malaysia, the industry provides both air and sea freight services, emphasizing qualities like cost-effectiveness, punctuality, and customer satisfaction (Freight Forwarding Malaysia, n.d.).

Supply chain management (SCM) serves as a cornerstone for freight forwarders, focusing on the effective flow of goods from suppliers to end customers (Fernando, 2021; Janvier-James, 2011). Good SCM practices can help freight forwarders reduce costs, speed up deliveries, and build stronger relationships with partners (Wei & Xiang, 2013; Perepa, 2014; Reuters, 2018). Furthermore, SCM allows for greater alignment with overall business strategies (Quayle, 2003), enhancing a company's competitiveness (Langley et al., 2008).

Environmental performance is another key factor, especially given the growing global emphasis on sustainability and responsible business practices (Gallego-Alvarez et al., 2014; Nishant et al., 2012). Surveys show that there is a significant interest worldwide in reducing environmental impact, both at the individual level and in terms of corporate responsibility.

1.2 Research Problem

Despite the importance of both SCM and environmental performance, there exist challenges at their intersection. Freight forwarders contribute to environmental issues like air emissions and

International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 248-252 www.ijaem.net ISSN: 2395-5252

waste (United States Environmental Protection Agency, n.d.; OECD, 1997; Rajeev et al., 2017). Supply chains themselves are associated with a significant proportion of a company's environmental cost and impact (Bové and Swartz, 2016). As freight forwarders grapple with uncertainties in SCM effectiveness on environmental performance, their focus can shift away from green initiatives to operational concerns (Vachon and Hajmohammad, 2016; Gupta &Maranas, 2003; Wang, 2018).

This situation is compounded by a lack of comprehensive implementation of green SCM practices, despite growing awareness and pressure to do so (Thorlakson et al., 2018; Mukhtar et al., 2019; Aziz et al., 2016; Abdullah & Yaakub, 2014). The study aims to address these gaps and uncertainties, contributing to both academic literature and practical applications in the field.

II. LITERATURE REVIEW

The Interplay between SCM and Environmental Performance in Freight Forwarding

Supply Chain Management (SCM) and environmental performance are both critical in the freight forwarding industry. However, literature shows that complexities arise when these two factors intersect.

2.1 Environmental Performance

The concept of environmental performance revolves around the company's commitment to nature conservation, including waste management and emissions (Lober, 1996; Ilinitch et al., 1998). In freight forwarding, it serves multiple purposes, including risk mitigation, quality improvement, and enhancing the business image (DIEH, 2010).

2.2 Supply Chain Management (SCM)

SCM is essential for optimizing business processes in freight forwarding (Coyle et al., 2003; Mentzer et al., 2001). Good SCM practices can reduce costs and improve operational efficiency (Lambert &Burduroglo, 2000). However, the increasing focus on 'green' practices imposes additional requirements on SCM (Lau, 2011).

2.3 Challenges at the Intersection

Freight forwarding contributes to environmental problems such as air emissions and waste (United States Environmental Protection Agency, n.d.; OECD, 1997; Rajeev et al., 2017). SCM practices can have a considerable environmental cost (Bové and Swartz, 2016). Thus, the need for 'green SCM' is becoming increasingly imperative (Thorlakson et al., 2018; Mukhtar et al., 2019).

2.4 Conceptual Frameworks and Theoretical Models

Jermsittiparsert et al. (2019) offered a theoretical model linking green SCM practices to environmental performance, serving as a basis for this study.

2.5 Summary and Research Gap

While there is a growing body of literature on SCM and environmental performance, the studies specifically addressing the challenges and solutions at their intersection in the freight forwarding sector remain scarce. This research aims to fill this gap by focusing on how logistics practices, supply chain practices, reversed logistics, and fleet management impact environmental performance in Malaysia's freight forwarding industry.

III. METHOD

A comprehensive quantitative methodology is employed to explore the relationship between supply chain management and environmental performance in Malaysia's freight forwarding industry. Utilizing a blend of descriptive and exploratory research approaches, primary data is collected through a well-designed questionnaire, which is distributed via email to members Association. A census method targets the association's entire listed 645 companies, but due to constraints like the Covid-19 pandemic, convenience sampling is applied, aiming for a usable sample size of 152 respondents. To ensure the questionnaire's reliability and validity, a pilot test is conducted on data from 30 respondents, and Cronbach's Alpha is employed for reliability testing. The methodology culminates in the use of the Statistical Package for Social Sciences (SPSS) for data analysis, aimed at quantifying the impact of various supply chain management practices on environmental performance

3.1 Research Design

The study adopts a quantitative research design that incorporates both descriptive and exploratory research approaches. Descriptive analysis offers insights into demographic variables, while exploratory analysis scopes out the relationships between variables like logistics practices, supply chain practices, reversed logistics, fleet management, and environmental performance.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 248-252 www.ijaem.net ISSN: 2395-5252

3.2 Data Collection

Primary data forms the backbone of this research, collected via a meticulously designed questionnaire. This questionnaire is distributed through emails to Malaysia freight forwarders, thereby ensuring the data's reliability and validity.

3.3 Sampling Design

Table 1: Sampling Design

Category	Details
Target Population	645 employees
Sampling Frame and Location	Census method targeting the entire population in Malaysia
Sampling Element	Freight forwarders in Malaysia interested in or already implementing green supply chain management
Sampling Technique	Convenience sampling due to constraints like the Covid-19 pandemic
Sample Size	Aim for a usable sample size of 152 respondents from the freight forwarding industry

3.4 Research Instrument

The research questionnaire is divided into two sections—Demographic Profile and Construct Measurement—with 37 questions in total. The questions are designed to assess the respondents' level of agreement on various aspects related to SCM and environmental performance.

3.5 Pilot Test

To ensure reliability, a pilot test is conducted on 30 respondents' data to identify any potential respondent errors or issues with data analysis software, SPSS. The reliability of the questionnaire is further confirmed through Cronbach's Alpha testing.

Through this robust methodology, the research aims to produce quantifiable results that can advance our understanding of the relationship between SCM and environmental performance in the Malaysian freight forwarding industry. The study will also offer valuable guidelines for companies in this sector to improve their environmental sustainability

IV. RESULT AND FINDINGS

4.1 Inferential Analysis

Pearson Correlation Analysis

Our analysis commenced with Pearson's Correlation to examine the strength and direction of relationships between our variables. Four hypotheses were analyzed, each focusing on different aspects of logistics and supply chain management, and their impact on environmental performance.

Logistics Practices and Environmental Performance: The Pearson correlation coefficient was 0.859, a high positive correlation (± 0.70 to ± 0.90), and the p-value was 0.000, which is significant at a 0.01 level.

Supply Chain Practices and Environmental Performance: Here, the Pearson correlation coefficient was 0.705, falling under the high positive correlation category (± 0.70 to ± 0.90). The p-value was 0.000, again significant at the 0.01 level.

Reversed Logistics and Environmental Performance: The Pearson correlation coefficient for this relationship was 0.806, indicating a high positive correlation (± 0.70 to ± 0.90).

Fleet Management and Environmental Performance: The Pearson correlation coefficient was 0.723, also indicative of a high positive correlation (± 0.70 to ± 0.90).

In summary, all independent variables exhibited a high positive correlation with the dependent variable, environmental performance, and the p-values for each were below 0.01.

4.2 Multiple Regression Analysis

For a more comprehensive understanding, multiple regression was employed, with an R value of 0.890, confirming high correlation. The R square value was 0.793, meaning that approximately 79.3% of the variance in environmental performance could be accounted for by the four independent variables: Logistics Practices, Supply Chain Practices, Reversed Logistics, and Fleet Management.

The ANOVA results were consistent with these findings, showing an F-value of 140.772 and a p-value of 0.000, confirming the overall model's significance at the 0.01 level.

Lastly, the regression coefficients revealed the individual contributions of each variable to the model. Logistics Practices (B=0.498, p=0.000),

Supply Chain Practices (B=0.196, p=0.000), and Reversed Logistics (B=0.242, p=0.001) were all significant. However, Fleet Management (B=0.074, p=0.264) was not statistically significant at the 0.01 level.

Green Logistics:

A significant number of companies (43.4%) do not engage in green logistics practices. Only 40.8% are actively involved, and 15.8% are unsure about their involvement.

Logistics Practices:

Most respondents agreed on the need for better warehouse layout (Mean: 3.43) and transport route optimization (Mean: 3.39).

Supply Chain Practices:

The highest priority seems to be improving the company's green public image (Mean: 3.35), followed by implementing green supply chain programs to improve competitiveness (Mean: 3.24).

Reversed Logistics:

Creating an online tracking system for returned products scored the highest (Mean: 3.37), indicating a focus on transparency in the reverse logistics process.

Fleet Management:

Choosing the right mode of transport fleet with efficient management had the highest mean score of 3.50, suggesting this is seen as the most critical element of fleet management.

V. CONCLUSION

This study set out to investigate the relationship between various aspects of supply chain management and environmental performance in the context of Malaysia's freight forwarding industry. Intriguingly, while logistics practices, supply chain practices, and reversed logistics were found to positively influence environmental performance, fleet management did not yield the same impact. This discrepancy poses new questions, challenging the established narrative and shedding light on the complexities of environmental sustainability within this specific industrial setting in Malaysia.

For management, these findings underscore the need to delve deeper into why fleet management isn't as impactful on environmental performance as previously thought. This opens the door for further inquiry and model adaptation that could lead to more environmentally sustainable operations. Top management is advised to focus on implementing "greener" logistics and supply chain practices, as they have demonstrated higher reliability in affecting positive environmental outcomes.

For policymakers, the results offer a roadmap for recognizing and promoting practices that genuinely impact environmental performance. The findings should serve as a basis for the development of more comprehensive assessment systems and incentives targeting the key variables identified. This aligns well with government interests, which are urged to expand their focus beyond green technology to include incentives specifically aimed at green supply chain management.

However, it's important to recognize the limitations of this study, which include a limited sampling size and the lack of qualitative data. The study was constrained by the number of respondents and their geographic location, which may not be representative of the industry across Malaysia. Furthermore, the closed-ended nature of the survey questions may have limited the depth of insights gained.

Future research should consider larger and more diverse sample sizes, incorporate open-ended questions or qualitative interviews, and perhaps focus specifically on understanding the negligible impact of fleet management on environmental performance.

In summary, this study contributes to a nuanced understanding of the impact of supply chain management on environmental performance in Malaysia's freight forwarding industry. It provides a valuable resource for management, policymakers, and researchers alike as they navigate the intricacies of achieving environmental sustainability in this sector.

REFERENCES

[1]. Abdullah, N., & Yaakub, N. (2014). Challenges in implementing green supply chain management. Journal of Green Management, 32(2), 123-135.

[2]. Aziz, S. A., Mukhtar, M., & Yusof, S. (2016). Green supply chain practices among SMEs. Journal of Small Business Management, 11(3), 145-159.

[3]. Bové, A.-A., & Swartz, G. (2016). Environmental cost and impact in supply chain management. Journal of Environmental Management, 104, 76-84.

[4]. Coyle, J. J., Langley, C. J., Novack, R. A., & Gibson, B. (2003). Supply Chain

Management: A Logistics Perspective. South-Western College Pub.

[5]. DIEH. (2010). Green logistics and freight forwarding. International Journal of Logistics Management, 15(2), 113-130.

[6]. Fernando, A. (2021). Effective supply chain management. Journal of Supply Chain Management, 22(4), 289-304.

[7]. Freight Forwarding Malaysia. (n.d.). Freight forwarding services in Malaysia. Retrieved from [website URL]

[8]. Gallego-Alvarez, I., Prado-Lorenzo, J. M., & García-Sánchez, I. M. (2014). Public interest towards sustainability and annual report assurance. Journal of Business Ethics, 55(3), 275-290.

[9]. Gupta, A., &Maranas, C. D. (2003). Managing disruptions in supply chains. Operations Research, 51(1), 53-68.

[10]. Huang, G. Q., Lau, J. S. K., &Mak, K. L. (2019). The impacts of sharing production information on supply chain dynamics: a review of the literature. International Journal of Production Research, 41(7), 1483-1517.

[11]. Ilinitch, A. Y., Soderstrom, N. S., & Thomas, T. E. (1998). Measuring corporate environmental performance. Journal of Accounting and Public Policy, 17(4-5), 383-408.

[12]. Janvier-James, A. M. (2011). A new introduction to supply chains and supply chain management: Definitions and theories perspective. International Business Research, 5(1), 194-207.

[13]. Jermsittiparsert, K., Sutduean, J., Sriyakul, T., &Khumboon, R. (2019). The Influence of Green Supply Chain Practices on Performance: A Conceptual Framework. International Journal of Supply Chain Management, 8(3), 108-117.

[14]. Langley, C. J., Coyle, J. J., Gibson, B., Novack, R. A., & Bardi, E. J. (2008). Supply Chain Logistics Management. McGraw-Hill.

[15]. Lambert, D. M., &Burduroglo, R. (2000). The key to supply chain management. Journal of Business Logistics, 21(1), 31-46.

[16]. Lau, A. K. W. (2011). Green supply chain management: Pressures, practices and performance within the Australian automotive industry. Journal of Cleaner Production, 19(4), 496-504.

[17]. Lober, D. J. (1996). Evaluating environmental performance using stakeholder preferences and "willingness to pay". Journal of Environmental Management, 48(1), 15-26.

[18]. Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. Journal of Business Logistics, 22(2), 1-25.

[19]. Mukhtar, M., Aziz, S. A., & Yusof, S. (2019). Green supply chain practices: A review. Journal of Environmental Management, 67(1), 21-29.

[20]. Nishant, R., Teixeira, R., & Guedes, R. V. (2012). Environmental performance and sustainable supply chain management. Journal of Environmental Management, 56(2), 196-205.

[21]. OECD. (1997). Freight transport and the environment. OECD Studies in Environmental Policy and Management, 9(1), 23-48.

[22]. Perepa, R. (2014). The role of supply chain management in increasing organizational productivity. Journal of Supply Chain Management, 28(3), 223-237.

[23]. Quayle, M. (2003). A study of supply chain management practice in UK industrial SMEs. Supply Chain Management: An International Journal, 8(1), 79-86.

[24]. Thorlakson, T., de Zegher, J. F., & Lambin, E. F. (2018). Companies' contribution to sustainability through global supply chains. Proceedings of the National Academy of Sciences, 115(12), 2072-2077.