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Exploring the Relationship between Supply Chain Management Practices and Environmental Performance in the Freight Forwarding Industry: A Case Study in Malaysia

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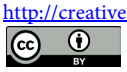

Abstract

Within the bustling freight forwarding industry of Malaysia, the effects of supply chain management on environmental performance stand largely uncharted. This article delves deep into the intricate relationships between logistic practices, reversed logistics, fleet management, and their cumulative environmental ramifications. Spurred by the surge in demand for freight forwarding and its consequential environmental footprint, the research underscores the transformative potential of green supply chain adoption. Not only as a beacon of environmental stewardship but as a formidable competitive edge. As the freight forwarding realm grapples with ambiguity over the true environmental weight of their supply chain operations, our findings unveil pivotal insights. By bridging this knowledge chasm, the research paves the way for fostering sustainable practices that harmoniously marry operational prowess with ecological prudence. Beyond its immediate audience, this article beckons industries far and wide, championing the pivotal role of environmental conscientiousness in modern supply chain dynamics.

Keywords

Supply Chain Management, Environmental Performance, Logistic Practices, Supply Chain Practices, Reversed Logistics, Fleet Management and Freight Forwarding Industry, Malaysia

1. Introduction

The freight forwarding industry plays a crucial role in the import and export of goods, serving small and medium-sized firms in Malaysia (Freight Forwarding

Malaysia, 2021). Effective supply chain management is essential for freight forwarders to meet client expectations and achieve competitive advantages (Coyle, Bardi, & Langley, 2003). Supply chain management encompasses the flow of commodities, transforming raw materials into final products, and their distribution to end consumers (Kleab, 2017). It includes activities such as sourcing, logistics, inventory management, transportation, and collaboration with suppliers and third-party service providers (Langley, Coyle, Gibson, Novack, & Bardi, 2008). Through efficient supply chain management, freight forwarders can reduce costs, improve customer value, gain market information, and enhance relationships with stakeholders (Mentzer et al., 2001).

Environmental performance has gained significant importance in recent years due to growing concerns about sustainability and the impact of business operations on the environment (Arafat, Warokka, & Dewi, 2012). A strong environmental performance can lead to cost savings, reduced consumption of resources, and enhanced reputation (Ilinitch, Soderstrom, & Thomas, 1998). However, there is a need to explore the relationship between supply chain management practices and environmental performance in the context of the freight forwarding industry (El Saadany, Jaber, & Bonney, 2011). This research aims to fill this gap by investigating the correlation between logistic practices, supply chain practices, reversed logistics, and fleet management with environmental performance (Jayaraman & Luo, 2007).

The research problem arises from the increasing demand for freight forwarding services and the associated negative environmental consequences (Organisation for Economic Co-operation and Development, 1997). Poor logistics management has led to pollution, including air emissions, water pollution, and improper disposal of waste (Bové & Swartz, 2016). The lack of certainty regarding the contribution of supply chain practices to environmental performance creates challenges for freight forwarders, who often prioritize operational matters over environmental concerns (Besiou, Martinez, & Van Wassenhove, 2012). This study seeks to address these challenges and provide insights into improving environmental performance through sustainable supply chain practices (Borade & Bansod, 2007).

2. Literature Review

The literature review explores the existing body of knowledge on the topic of supply chain management and its relationship with environmental performance. The review examines various factors that contribute to environmental performance, including logistics practices, supply chain practices, reversed logistics, and fleet management.

According to Lober (1996), environmental performance is crucial for corporations to conserve and protect the natural world. It involves maintaining air and water quality, minimizing waste generation, and reducing emissions (Lober, 1996). Logistics practices play a vital role in achieving environmental perfor-

mance. They encompass activities such as inventory planning, transportation management, and warehousing. Researchers like Mellat-Parast & Spillan (2014) emphasize that effective logistics practices lead to lower costs, increased productivity, and efficient resource management (Mellat-Parast & Spillan, 2014). Supply chain practices also contribute to environmental performance. These practices involve the coordination of manufacturers, distributors, and transportation providers to deliver goods to customers. Sustainable supply chain practices, such as green purchasing and efficient distribution, are known to improve environmental outcomes (Perera et al., 2013). Reverse logistics, which involves the management of product returns and waste disposal, is another important factor influencing environmental performance. Researchers like Richey et al. (2005) highlight those businesses can enhance their environmental performance by adopting practices such as recycling, refurbishing, and proper disposal of materials (Richey et al., 2005).

Fleet management plays a significant role in achieving environmental objectives. Aflabo et al. (2020) emphasize that effective fleet management includes factors such as vehicle selection, fuel efficiency, and driver safety. Implementing greener fleet management practices, such as using electric vehicles and optimizing routes, can positively impact environmental performance (Aflabo et al., 2020).

3. Method

The research design serves as a comprehensive plan for collecting and analyzing data based on the study's research questions and goals (Hassan & Khairuldin, 2020). It focuses on examining the relationship between supply chain management and the environmental performance of freight forwarding businesses in Malaysia.The primary data collection method utilized in this study is the administration of a questionnaire (Ajayi, 2017).

4. Sampling Approach

In the context of this research, we employ the convenience sampling technique. This method is non-probabilistic in nature, where participants are self-selected (Stratton, 2021). The adoption of this sampling approach is influenced by the constraints arising from the Covid-19 pandemic, which led to the temporary shutdown of certain facilities, and the non-delivery of some emails. As such, approximately 100 questionnaires were disseminated. The sample encompasses a total of 100participants. Each one of these participants operates as a freight forwarder within Malaysia, with a specific emphasis on those incorporating eco-friendly practices into their supply chain management.

5. Research Tools

The main objective is to gather pertinent information from the selected participants for further evaluation. The survey acts as an efficient tool in data accumu-

lation. Given that the questions are tailored for this research's unique context, it enhances the accuracy and reliability of the findings.

When constructing the survey, the following aspects were considered: 1) Identifying the right questions; 2) Crafting the questions appropriately; 3) Strategizing the sequence of questions; 4) Preliminary testing of the survey and making the necessary revisions, based on reference from (Zikmund et al., 2013). As a result, Section B will employ closed-ended questions where participants will indicate their level of concurrence with the given statements.

Table 1 reveals that the survey, consisting of 37 items, is distributed via Google Form. This system automatically sends an email containing a customized link to the designated recipients (through Gmail) for completion. Section A captures essential details about the participants and the broader characteristics of their respective companies. Concurrently, Section B employs a 5-tier Likert scale to gauge participants' agreement levels on statements related to the impact of supply chain management on ecological efficiency.

The questionnaire allows for the direct collection of data from the target respondents, providing reliable and specific information related to the research problem. A convenience sampling technique is employed in this study (Stratton, 2021). This non-probability sampling method is chosen due to constraints such as limited accessibility to certain respondents caused by the Covid-19 pandemic and returned emails. The sample population includes freight forwarders in Malaysia, particularly those practicing environmentally responsible supply chain management. The research instrument used for data collection is a structured questionnaire (Zikmund et al., 2013). The questionnaire consists of two sections: Section A focuses on capturing the demographic profile of the respondents, while Section B measures constructs related to reversed logistics, supply chain practices, logistics practices, fleet management, and environmental performance. Quantitative data analysis techniques will be employed to analyze the acquired data (Mertler, 2016). Descriptive analysis will be used to examine the characteristics of the collected data, and exploratory analysis will help in determining the relationship between variables.

Table 1. Breakdown of survey.

Survey Section	Number of Items
Section A—Participant Demographics	11
Section B—Aspects of Measurement	
1) Reversed Logistics	5
2) Operations within Supply Chain	5
3). Best Practices in Logistics	5
4) Management of Vehicle Fleet	6
5) Eco-Friendly Performance	5

6. Result and Findings

The demographic profile of the respondents was analyzed, including gender, age, department, position in the company, years of working, major products managed, number of years operating the business, customers' nature of business, average length of relationship with top 5 customers, participation in green environmental issues, and concerted effort to green logistics.

7. Descriptive Analysis: Findings, Analysis & Critical Insight

Demographic Profile

The gender distribution is listed in Table 2. A majority (63%) of the respondents are males. The presence of a significant female representation (37%) suggests a movement towards gender parity in the industry. While male dominance is evident, the industry might benefit from diversified perspectives if the gender gap narrows further, given the advantages of diverse teams in decision-making processes.

The age distribution is listed in Table 3. The 31 - 40 years bracket emerges as the dominant age group. The industry appears to rely heavily on mid-career professionals, potentially side-lining both young and older workers. There may be untapped potential or insights from these lesser-represented age groups.

The departmental representation is listed in Table 4. Logistics and Operations departments lead, with Finance lagging significantly. The underrepresentation of finance might suggest a potential vulnerability in comprehensive decision-making, especially in areas that require financial insights.

Table 2. Gender distribution.

Gender	No. of Respondents
Male	63
Female	37

Table 3. Age distribution.

Age Range	Percentage (%)
20 - 30 years	12.50
31 - 40 years	34.2
41 - 50 years	19.08

Table 4. Departmental representation.

Department	Percentage (%)
Logistics	30.92
Operations	28.95
Finance	0.66

The company position is listed in Table 5. The managerial segment dominates the sample. Over-reliance on senior positions for insights might mean missing ground-level challenges and innovative solutions that mid-tier or junior staff might offer.

The tenure in the company is listed in Table 6. A sizable chunk of respondents has been with their companies for 4 - 6 years. A potential lack of fresh perspectives with many employees staying in their roles for extended periods. Alternatively, it can also suggest stability and employee satisfaction.

The product managed is listed in Table 7. Consumer products have the most significant representation. Companies heavily dependent on consumer products might face challenges in volatile economic climates where consumer demand can fluctuate rapidly.

The customers' nature business is shown in Table 8. The Food and Beverages sector leads in customer representation. Diversification of customer sectors may be needed to mitigate potential risks associated with over-reliance on a single sector.

Relationships with top customers span several years. Long-standing relationships suggest loyalty but also hint at potential complacency, which might make it

Table 5. Company position.

Position	No. of Respondents
Managers/Senior Managers	53
General Managers/Directors	35
Executives/Senior Executives	12

Table 6. Tenure in the company.

Years of Working	Percentage (%)
4 - 6 years	34.21
Over 10 years	11.18

Table 7. Products managed.

Product Type	Percentage (%)
Consumer Products	48.03
Industrial Products	28.29
Other Products	23.68

Table 8. Customers' nature of business.

Business Sector	Percentage (%)
Food and Beverages	21.05
Others (Automotive, etc.)	1.97

difficult to onboard new clients or innovate the client experience. This average relationship duration with top5 customers is shown in Table 9.

The findings revealed that the gender distribution was relatively even, with 63 male and 37 female respondents. The majority of respondents fell into the age range of 31 - 40 years old, followed by 41 - 50 years old and 20 - 30 years old. The department of logistics had the highest representation among respondents, while the department of finance had the fewest. The majority of respondents held managerial positions, and most had worked for the company for 4 - 6 years. Consumer products were the most commonly managed by the respondents' organizations, and the majority of companies had been operating for 11 - 20 years. The nature of businesses belonging to customers who purchased food and beverages accounted for the largest percentage. The average length of the relationship with top 5 customers was mainly between 4 and 10 years. Most of the respondent companies participated in associations and programs but did not actively participate in those related to green environmental issues. Furthermore, a significant number of organizations did not implement green logistics practices.

The central tendencies of measurement were examined for five constructs: logistics practices, supply chain practices, reversed logistics, fleet management, and environmental performance. Each construct consisted of multiple questions, and the responses were analyzed to determine the central tendencies. The findings showed the distribution of responses for each question, providing insights into the level of agreement or disagreement among respondents for each construct.

Pearson correlation analysis was conducted to examine the relationships between the independent variables (logistics practices, supply chain practices, reversed logistics, and fleet management) and the dependent variable (environmental performance). The correlation coefficients were calculated, and the significance levels were assessed. The findings indicated strong positive correlations between logistics practices and environmental performance, supply chain practices and environmental performance, reversed logistics and environmental performance, as well as fleet management and environmental performance. The correlation coefficients fell within the range of high positive correlation (0.70 to 0.90) according to the rule of thumb. All correlations were found to be significant at the 0.01 level.

8. Pearson Correlation Analysis

The strength of relationships between the research variables was quantified using the Pearson Correlation Coefficient. The interpretations of correlation

Table 9. Average relationship duration with top 5 customers.

Years of Relationship	Percentage (%)
4 - 10 years	51.97
Over 15 years	11.18

strength are categorized is shown Table 10.

Hypothesis 1: A positive relationship exists between logistics practices and environmental performance.

Analysis: The data reveals a correlation coefficient of 0.859, landing in the high positive correlation range. Given the significant p-value (0.000) at the 0.01 level, Hypothesis 1 is supported. This is listed in Table 11.

Hypothesis 2: A positive relationship exists between supply chain practices and environmental performance.

Analysis: The correlation coefficient is 0.705, signifying a high positive correlation. Coupled with a p-value of 0.000, Hypothesis 2 is validated. This is listed in Table 12.

Hypothesis 3: A positive relationship exists between reversed logistics and environmental performance.

Analysis: With a correlation coefficient of 0.806, this indicates a high positive correlation. Given the significant p-value (0.000), Hypothesis 3 stands substantiated. This is listed in Table 13.

Hypothesis 4: A positive relationship exists between fleet management and environmental performance.

Analysis: The study found a correlation coefficient of 0.723, showcasing a high positive correlation. The p-value (0.000) further underscores and supports Hypothesis 4. This is listed in Table 14.

Table 10. A simplified approach to Pearson's correlation coefficient.

Size of Correlation	Interpretation
±0.90 to ±1.00	Very high correlation
±0.70 to ±0.90	High correlation
±0.50 to ±0.70	Moderate correlation
±0.30 to ±0.50	Low correlation
±0.10 to ±0.30	Negligible correlation

Table 11. Logistics practices vs. environmental performance.

	LP	EN
LP Pearson Corr.	1	0.859**
Sig. (2-tailed)		0.000
N	152	152

Table 12. Supply chain practices vs. environmental performance.

	SC	EN
SC Pearson Corr.	1	0.705**
Sig. (2-tailed)		0.000
N	152	152

Table 13. Reversed logistics vs. environmental performance.

	RL	EN
RL Pearson Corr.	1	0.806**
Sig. (2-tailed)		0.000
N	152	152

Table 14. Fleet management vs. environmental performance.

	FM	EN
FM Pearson Corr.	1	0.723**
Sig. (2-tailed)		0.000
N	152	152

There exists a strong positive correlation between the selected logistical practices (independent variables) and environmental performance (dependent variable). Notably, the p-values for all independent variables are below 0.01, bolstering the reliability of these conclusions.

9. Discussions of Major Findings

The findings of this study confirm Hypothesis 1 (H1) and are consistent with previous research conducted by Tambovceva & Tambovcevs (2012) and Subramaniam (2021). These studies have shown that logistics practices play a significant role in environmental performance. Effective logistics practices focused on environmental sustainability can lead to waste reduction and resource conservation. The current study further emphasizes the influence of logistics practices on environmental quality, particularly in developing countries like Malaysia where there is still room for improvement in achieving "green logistics" (Tambovceva & Tambovcevs, 2012; Subramaniam, 2021).

Hypothesis 2 (H2) is supported by the prior research of Perera et al. (2013) and Jermsittiparsert et al. (2019). These studies have demonstrated that supply chain practices have a strong relationship with environmental performance. Supply chain activities can generate various forms of waste, such as greenhouse emissions and packaging materials. Implementing green supply chain practices can significantly improve environmental performance (Perera et al., 2013; Jermsittiparsert et al., 2019).

Hypothesis 3 (H3) is supported by the findings of previous studies conducted by Jayaraman & Luo (2007) and Ali et al. (2020). These studies have highlighted the importance of reversed logistics in enhancing environmental performance. Reversed logistics processes, such as reuse, recycling, and remanufacturing, can effectively reduce waste and contribute to environmental sustainability when aligned with the existing laws and regulations in Malaysia (Jayaraman & Luo, 2007; Ali et al., 2020).

Contrary to Hypothesis 4 (H4), the findings of this study do not support the

earlier research conducted by Fraselle et al. (2021) and Rodriguez et al. (2022). The lack of association between fleet management and environmental performance suggests that Malaysian freight forwarders may not prioritize environmental concerns related to fleet management. It also indicates that the pressure from the government and other stakeholders may not be strong enough to drive environmental preservation efforts within fleet management practices (Fraselle et al., 2021; Rodriguez et al., 2022).

10. Conclusion

This study, set within the context of Malaysia's freight forwarders, underscores the significant influence of logistics, supply chain processes, and reverse logistics on environmental performance. Conversely, fleet management's environmental impact appears negligible in this regional setting. Several challenges, such as the limited sample size due to the Covid-19 pandemic and a lack of context-specific research references, emerged during the study. Recommendations for future research include broadening the sample size, introducing open-ended questions, and leveraging qualitative methodologies to attain a more in-depth understanding. Given the global push towards environmental sustainability, it's imperative for the Malaysian freight forwarding sector to align its operations with eco-conscious standards. This research serves as a stepping stone, highlighting both strengths and potential areas for enhancement.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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