IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, February 2023

Green Supply Chain Management Practices and Sustainability Performance

Namarta[1] and Dr. Deepak Tiwari[2]
[1]Research Scholar, Department of Commerce and Management
[2]Professor, Department of Commerce and Management
NIILM University, Kaithal, Haryana

Abstract: *Green supply chain management is evolved from supply chain management. The tenet of GSCM is to minimize or eliminate wastages including hazardous chemical, emissions, energy and solid waste along supply chain. This study aims to investigate the relationship between GSCM practices including supplier selection, supplier evaluation, environmental collaboration, internal environmental practices, green product and process design, and sustainability performance. The findings show that environmental collaboration, internal environmental practices, green product and process design have significant positive relationships with sustainability performance. The practice of green product and process design is the best predictor of sustainability performance. Surprisingly, supplier selection and supplier evaluation have no significant and positive relationship with sustainability performance. The result of this study is especially important for manufacturers in implementing GSCM practices within their respective organizations in order to achieve sustainability performance.*

Keywords: Green procurement, Eco-friendly logistics, Reverse logistics

I. INTRODUCTION

SCM gave rise to GSCM. The 1950s saw the introduction and popularization of the SCM idea as firms used mass manufacturing to reduce production costs. Businesses have been acting in a socially and ethically responsible way in their supply chains as a result of the growing awareness of green practices and the heightened competitiveness in the 1990s.

In order to address the impacts and connections between SCM and the natural environment, the GSCM concept is presented by including a "green" element into SCM. The goal of GSCM is to reduce or completely eradicate waste in the supply chain, including solid waste, emissions, hazardous chemicals, and energy. Furthermore, GSCM is an environmentally friendly program that aims to enhance process and product performance in accordance with environmental requirements.

According to Van Hoek, GSCM is an inventive and competitive instrument for organizational sustainability that lowers environmental risk and concurrently produces financial and environmental advantages. Furthermore, GSCM was created to help businesses be more ecologically conscious and to support sound business practices in order to increase profitability. These days, global customers are becoming more aware and demanding ecologically friendly goods, and environmental concerns are being incorporated more and more into international commerce and markets.

If irrational resource use and careless environmental degradation persist and burden the whole product life cycle, from the acquisition of raw materials to manufacture, usage, and final disposal, the global environmental capacity may be surpassed. Together with SCM, environmental issues like hazardous waste should be handled and regarded as a crucial component of production processes for the expansion of industry.

Businesses really work under a number of interconnected demands from many stakeholders, including shareholders, society, governments, customers, the market, and corporate organizations, when it comes to environmental issues like material conservation and lower water and energy use. Due to the fast changes in business, environmental and social concerns have become more relevant, especially in global manufacturing situations.

In order to achieve balanced development in terms of economic, environmental, and social factors without endangering the environment, businesses are under pressure to incorporate GSCM techniques into their operations. Thus, this

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, February 2023

research aims to investigate the connection between sustainability performance in Malaysian manufacturing firms and green supply chain strategies. As a result, the following five theories are put forth:

H_1: Sustainability performance is strongly correlated with supplier selection.

H_2: Sustainability performance is favourably correlated with supplier assessment.

H_3: Sustainability performance is favourably correlated with environmental cooperation.

H_4: Performance in terms of sustainability is favourably correlated with internal environmental practices.

H_5: Sustainability performance is strongly correlated with the design of green products and processes.

II. LITERATURE REVIEW

1. Supplier Selection

"The process by which firms identify, evaluate, and contract with suppliers" is what is meant by supplier selection. Bali state that the green strategy emphasizes the green performance of its suppliers as well as internal green activities. Since the buyer's company's long-term, sustained success greatly depends on its appropriate selection of raw material sources, choosing a supplier is a crucial buying operation carried out in organizations.

According to Lippmann, a number of essential components are necessary for the effective implementation of GSCM. Written GSCM policies, supplier meetings, training, cooperative research and development, top-level leadership, cross-functional integration, efficient communication between the company and its suppliers, efficient procedures for identifying, assessing, choosing, and collaborating with suppliers, and reorganizing relationships with suppliers and customers are all examples of the components.

It is evident that the firm's competence is closely correlated with the skills of its suppliers. According to Roa, GSCM has to work with suppliers based on green product designs, hold awareness seminars, and assist suppliers in developing their own environmental program. As a result, in order for their suppliers to be accepted as qualified suppliers, businesses should define the requirements and standards that they must adhere to, such as ISO 14001, Environmental Management Systems, and technical and performance requirements.

2. Supplier Evaluation

Since components and raw materials account for a significant portion of the product's cost, evaluating suppliers may be a complicated multi-criteria process that takes into account both the qualitative and quantitative aspects of supplier performance. Price is one financial factor used to evaluate suppliers; other non-financial criteria include quality, quantity, delivery, service, and communication. Significant expenses related to ordering, shipping, receiving, inspecting, and utilizing goods and components that have been acquired should also be taken into account when evaluating suppliers.

For businesses in industrial sectors, a competent supplier plays a critical role in removing environmental risk from supply chain management. In fact, government voluntary EMS programs and ISO 14001 accreditation have a significant impact on supplier assessment practices. By requiring suppliers to follow certain environmental guidelines, the programs greatly speed up the supplier assessment process and improve environmental performance. As a result, many businesses develop long-term relationships with suppliers, assess supplier performance on a regular basis, and develop alternate supply methods and solutions.

III. ENVIRONMENTAL COLLABORATION

In response to client demands for ecologically sustainable products and services as well as government environmental requirements, manufacturing companies have begun using GSCM. Manufacturers and suppliers are now working together to improve environmental sustainability as a result of the demands. The key component of GSCM that enables supply-side socially and ecologically responsible operations is cooperation between the supplier and the focus firm. In terms of the environment, collaboration is a strategy that aids businesses in enhancing and bolstering the environmental capabilities of its suppliers.

Businesses are increasingly integrating environmental cooperation into their strategic strategies and procedures. Paulraj states that environmental collaboration entails working with suppliers to improve waste reduction efforts and accomplish environmental goals, giving them design specifications for purchased items that include environmental requirements, encouraging them to create new source reduction strategies, working with them to produce cleaner

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, February 2023

products, and assisting them in supplying materials, equipment, parts, and services that support organizational objectives. Furthermore, senior management has a significant impact on the extent of an organization's sustainability initiatives.

INTERNAL ENVIRONMENTAL PRACTICES

To guarantee a successful deployment of GSCM practices, the enterprises must include the essential GSCM practices into their entire strategy. Businesses may begin incorporating GSCM techniques, such as eco design, investment recovery, green buying, and supplier and customer engagement, into their operations. Both middle and upper management must fully support and adhere to the internal environmental practices.

To guarantee environmental excellence, top management must be totally committed to GSCM practices. Furthermore, senior management must recognize the significance of environmental issues in a supply chain and back the preliminary evaluation by fully assuming responsibility for environmental monitoring initiatives.

The greatest methods to encourage and guarantee that suppliers are adhering to green practices and procedures are supplier quality management and supplier audits. Additionally, the supplier audit will guarantee that suppliers provide compliance declarations from their engineering change, manufacturing, quality, billing, and shipping processes. Dates of compliance and supplier requirements, including procedures for compliance verification, should be included in a compliance statement. Additionally, by collecting and analyzing data from publicly available environmental records, company-specific questionnaires, and the complete supplier base, manufacturers or independent third parties collaborate with suppliers to discover and audit environmental monitoring efforts.

GREEN PRODUCT AND PROCESS DESIGN

The use of environmentally friendly raw materials, design for reduced material and energy consumption, cleaner energy technology processes to reduce solid and liquid waste, and reverse logistics are some of the concepts incorporated into the environmentally conscious product and design. According to Gonzalez-Benito, companies that prioritize "ecologically responsible design of new product" are aware of the causes of any pollution or dangerously high concentrations of certain chemicals.

In actuality, companies may work with suppliers to get environmentally friendly materials and implement green practices across the whole product life cycle at the design level. GSCM principles including internal environmental management, eco-design, and investment recovery have been used by several businesses. Green design may be a methodical approach for businesses to reduce the environmental impact of their processes and products by lowering costs and increasing product marketability at the same time when the green issue is included into the creation of new products.

Furthermore, eco-design, also known as green design or design for the environment, aims to lessen the environmental impact of a product at every stage of its life cycle, from obtaining raw materials from suppliers to using, manufacturing, and disposing of them. The use of environmentally friendly materials, (i) designing products for reduced material and energy consumption, (ii) designing products for material and component part reuse, recycling, and recovery, (iv) avoiding or reducing the use of hazardous products, (v) optimizing processes to reduce solid/liquid waste and emissions, and (vi) using reverse logistics for product and/or manufacturing process are all examples of green product and process design practices in this study. It is suggested that these actions will significantly affect sustainability performance.

SUSTAINABILITY PERFORMANCE

Businesses who adopted GSCM methods saw improvements in their public perception, lower environmental responsibility, and cost savings. Inadequate environmental performance may have serious negative effects on the environment and cost businesses money in the form of decreased stock values. According to Flammer, businesses that practice eco-friendly behaviour see notable rises in stock prices, whereas businesses that practice eco-harmful behaviour see stock price declines.

As a result, businesses that care about their environmental impact could be able to draw in funding from investors who share their values. The significance of GSCM practices in sustainability performance which includes economic,

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, February 2023

environmental, and social performance has been emphasized by several academics. Without sacrificing cost, quality, dependability, or energy, GSCM methods may reduce the environmental hazards associated with corporate operations. A novel strategy that complies with environmental rules, such end-of-pipe management, reduces ecological consequences while boosting financial gain.

Additionally, the economic performance includes lower costs for energy use, waste disposal, and material acquisitions, as well as higher profits per share and return on investment. By reducing environmental risk and boosting ecological efficiency, GSCM has given businesses a new way to meet their profit and market share goals. Green practices emphasize "win-win relationships between economic and environmental performance" in order to justify their claims. Hasan came to the conclusion that GSCM methods may help businesses become more efficient, save expenses, lessen the influence of management, enhance customer service, maximize sales, boost market share, revenue, and growth, and improve their reputation.

IV. DATA ANALYSIS

The 148,678 small and medium-sized manufacturing businesses in Malaysia make up the study's population. To accept a sampling error level of 5%, a study sample size of 400 is needed, according to Weisberg and Bowen. Potential respondents received questionnaires by hand delivery and email that used a 5-point Likert scale with strongly disagree and strongly agree as the end points. The SCM literature study indicates that surveys often have a low successful response rate, between 6% and 22%. Respondents were provided a variety of response-rate enhancement measures in order to increase the response rate.

The useable sample size from the hand-delivered survey and email. Hair said that the sample size was enough for testing hypotheses. CEOs, managing directors, and owners (41.1%), 47 production/operation managers (36.4%), supply chain/logistics managers (10.1%), and 16 other individuals (12.4%) made up the final sample. Generally speaking, more respondents were employed in the basic metal (8.5%), machinery and equipment (7.8%), and food product and beverage (38.0%) industries than in the other industrial groupings.

About 25.6% of businesses have been in operation for five to ten years. Furthermore, 72.1% of those surveyed were employed by small businesses with less than 50 workers. The indicators were examined for normalcy prior to the use of inferential statistical methods. A data set's resemblance to the normal distribution may be verified using the normality test. In this work, univariate normality was evaluated using the numerical approach of the skewness and kurtosis test. To satisfy the presumptions of univariate normality, the skewness and kurtosis of the variables should be within the advised range of +1.0 to -1.0.

The findings demonstrate that the variables' skewness and kurtosis values fall well within the recommended range of -1.0 to +1.0, demonstrating that they adhere to the standards of univariate normalcy. Exploratory factor analysis was used to demonstrate construct validity. Bartlett's test of sphericity was also found to be significant ($p < .01$), and the KMO measure of sample adequacy was found to be significantly above the suggested value of.

Cronbach's α values were used to evaluate reliability. It was discovered that every element was much higher than the permissible value. The outcomes are enough to demonstrate each construct's dependability. Regression analysis was conducted after a multicollinearity test. Two common metrics for assessing pairwise and multiple variable collinearity tests are the tolerance value and the variance inflation factor (VIF). The percentage of variance that an independent variable differs from other independent variables is known as tolerance. The reciprocal of a variable's tolerance is its VIF. When a variable's VIF is larger than 10 and its tolerance value is less than 0.10, there is a multicollinearity issue. According to the findings, no tolerance value is less than 0.10 and no VIP value is more than. As a result, this investigation shows no signs of a multicollinearity issue.

The study hypotheses were tested using multiple regression, which also examined the degree of correlation between the five independent variables and the dependent variable. At a p-value below 0.05, the results demonstrate a strong positive relationship between sustainability performance and environmental cooperation, internal environmental practices, and green product and process design. Nevertheless, there is no discernible positive correlation between sustainability performance and supplier assessment or selection ($p > 0.05$). The design of green products and processes has the largest beta value (0.322), which would have the most effect on sustainability performance. As a consequence,

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, February 2023

the sustainability performance would vary by 0.322 standard deviations. Three hypotheses are found to be supported by the findings, whereas two are not.

V. CONCLUSION

These results might affect academics working on theory development as well as managers and practitioners. For manufacturing firms, the outcomes are crucial in this period of difficult economic conditions. This report sheds light on some of the most innovative and diverse GSCM techniques used by Malaysian manufacturing firms. In order to carry out crucially important green supply chain tasks meant to improve organizational performance, it offers managers in Malaysian manufacturing industries a helpful tool to assess current green supply chain practices and suggests straightforward but effective and efficient GSCM practices.

According to the findings, internal environmental practices, environmental cooperation, and green product and process design should be the main focuses of GSCM practices for Malaysian manufacturing businesses. It was surprising to see that there was no statistically significant correlation between sustainability performance, supplier appraisal, and supplier selection. The disparate results might be explained by the fact that Malaysian manufacturers often choose and assess suppliers based on the price they offer rather than only on their technical and eco-design skills.

From a theoretical standpoint, this research expands on earlier GSCM frameworks in Western nations and deepens our knowledge of the connection between sustainability performance in Malaysian manufacturing firms and GSCM adoption. Unquestionably, this research has the potential to contribute to the current corpus of information in the manufacturing sector, sustainability performance, and GSCM. Given that a tiny sample size makes it very difficult to extrapolate the results to the industrial sector, it seems sense that future studies should include wider regional data coverage. Therefore, it is crucial that future study involve additional industrial businesses. If the outcome could accurately depict Malaysia's industrial sector, it would be much superior.

REFERENCES

[1]. Diabat, Govindan, K. An Analysis of the Drivers Affecting the Implementation of Green Supply Chain Management. *Resources, Conservation and Recycling,* 55(2011) 659-666.

[2]. H. Hu, C-W. Hsu, Critical Factors for Implementing Green Supply Chain Practice: An Empirical Study of Electrical and Electronic Industries in Taiwan. *Management Research Review*, (2010) 586-608.

[3]. J. Rajan, K. Ganesh, K. V. Narayanan, Application of Integer Linear Programming Model for Vendor Selection in a Two Stage Supply Chain. Proceedings of the 2010 International Conference on Industrial Engineering and Operations Management. 9-10 January. Dhaka, Bangladesh (2010).

[4]. S. Amemba, Green Supply Chain Best Practices in Hospitality Industry in Kenya. *Global Journal of Commerce & Management Perspectives*, 2(2013) 7-18.

[5]. J-B. Sheu, Y-H. Chou, C-C. Hu, An Integrated Logistics Operational Model for Green-Supply Chain Management. Transportation Research Part E: Logistics and *Transportation Review*, 41(2005) 287-313.

[6]. M. E. Huque, Islam, M. A. Supply Chain Management and Cost of Production Nexus – An Empirical Analysis. *Journal of Marketing*, 10(2007) 1-34.

[7]. Meythi, R. Martusa, Green Supply Chain Management: Strategy to Gain Competitive Advantage. *Journal of Energy Technologies and Policy*, 3(2013) 334-341.

[8]. O. Bali, E. Kose, S. Gumus, Green Supplier Selection Based on IFS and GRA. Grey Systems: *Theory and Application*, 3(2013) 158-176.

[9]. P. Roa, Greening the Supply Chain: A New Initiative in South East Asia. *International Journal of Operations and Production Management*, 22 (2002) 632-666.

[10]. R. D. Beil, Supplier Selection. Wiley Encyclopedia of Operations Research and Management Science, John Wiley & Sons (2010).

[11]. R. I. van Hoek, From Reversed Logistics to Green Supply Chains. *Supply Chain Management: An International Journal*, 4(1999) 129-135.

[12]. S. Lippmann, Supply Chain Environmental Management: Elements of Success. *Corporate Environmental Strategy*, 6(1999) 175-182.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 1, February 2023

[13]. S. Matos, J. Hall, Integrating Sustainable Development in the Supply Chain: The Case of Life Cycle Assessment in Oil and Gas Agriculture Biotechnology. *Journal of Operational Management*, 25(2007) 1083-1102.

[14]. Srivastava, S. K. (2007). Green Supply-Chain Management: A State-of-the-Art Literature Review. *International Journal of Management*, 9(1), pp. 53-80.

[15]. V. Anbumozhi, Y. Kanada, Greening the Production and Supply Chain in Asia: Is There A Role for Voluntary Initiatives? *JGES Kansai Research Center Discussion Paper*, KRC-2005, No 6E (2005) 1-19.