

Malaysian Automobile Industry and Green Supply Chain Management

Rafia Afroz, Ataur Rahman, Md Muhibbulah, Niaz Morshed

Abstract--- The automotive industry is one of the main producers of industrial wastes affecting the natural environment. The purpose of this study is to identify the most important barriers to the Malaysian automotive industry. The data were collected by researching 145 companies in Malaysia's automotive supply chain industry. The data were examined using Problem Conflict Index (PCI) to determine the most important critical barriers that put automotive companies in a difficult position to implement green supply chain management (GSCM). The results of this study report that the number one barrier in the automotive sector is "market competition and uncertainty" with a PCI of 298. The second problem is "Lack of Implementing Green Practices" with the PCI of 297. Like these two barriers, cost implications, unawareness of customers, lack of corporate social responsibility, lack of globalization, lack of technical assistance from government have been identified as top-level barriers and lack of the government's willingness to invest, reduced involvement in environmentally related conferences are recognized as most important bottom level barriers. The elimination of these barriers will help to apply the GSCM in the Malaysian automobile industry.

Keywords: Malaysian automotive industry; supply chain; barriers

1 INTRODUCTION

Recent literature focuses on supply chain management concerned with environmental issues through the emerging concept of green supply chain management (GSCM) [1, 2-5]. The green supply chain means to eliminate or minimize waste of resources (energy and materials) and negative environmental impacts (air, water, and land pollution) through all phases of a product's life cycle from the extraction of raw materials up to the use of the product by consumers and its disposal at the end of the product's life cycle [1, 6]. GSCM has three approaches: environment, strategy and logistics. GSCM is a company-wide harmonized effort and ensures that environmental performance is consistently developed at all management levels and on the floor of the workshop, rather than just taking the place of some green applications [7]. Rettab and Ben Brik [8] defined the green supply chain as a managerial approach aimed at minimizing the environmental and social impacts of a product or service or footprint.

The purpose of this article is to examine the most important barriers of GSCM implementation using the

Problem Conflict Index (PCI). The barriers identified in this study have been identified from the literature and in the questionnaire sent to the few industries in Malaysia. This article is divided into two parts (1) literature review focusing on definition and key barriers to the implementation of the GSCM; (2) determining the most important barriers to implementation of GSCM in practice among Malaysian producers. In particular, the last section sets out key issues that require special attention in the future.

2 RELEVANT REVIEW

The importance of environmental cooperation in the supply chain is increasing [9]. The different literature has focused on analyzing green practices in different sectors. Kuo et al. [10] reviewed Taiwan's motorcycle industries. Similarly, Mavani, P., & Pandya, A. R. [11] analyzed the pharmaceutical supply chain in Gujarat in India. Mohaghar and Ghosemi [12] examined a case study on the Iranian automotive industry and proposed a conceptual model for corporate strategy and supply chain performance. Chien and Shih [13] conducted an empirical study on the application of GSCM practices in the Taiwanese electrical and electronics industries. Chan et al. [14] observed risks related to the implementation of GSCM in the fashion industry. Indian researchers and practitioners analyzed GSCM because of pressure, pressure, barriers, drivers and performance from consumers and environmental regulations [15-18]. An important part of the literature review deals with the manufacturing sector; However, there were some cases where the service sector or other sectors were analyzed as well.

Muduli et al. [19] defined a firm's capacity constraints as a major obstacle to the implementation of the GSCM. Hassini et al. [20] shows that the biggest challenge facing small medium enterprises (SMEs) in significant up-front cost of green space. They have emphasized that managers of firms are unaware of existing advanced technologies and therefore are not in a position to adopt green practices. SMEs are faced with more difficulties during the adoption of GSCM than larger firms. The GSCM needs substantial funding to support infrastructure and human resource needs [16]. The benefits of GSCM are not only practical in the long run [21]. Therefore, SMEs do not have to make extra effort to adopt green practices. Several companies are eager to be more aware of common external environmental problems [22,23]. External factors include customer and market pressures. Government intervention is also an important factor in SMEs to adopt green practices. Sheu and

Revised Manuscript Received on March 10, 2019.

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Chen [24] analyzed the effects of government fiscal interventions on the adoption of GSCM. The government may also motivate a firm by providing technical assistance and incomplete information on green practices. This was proposed by Lee [25] and the study also suggested that the size of the firms played an important role in determining the barriers to the implementation of the GSCM. Standardization of industry processes is another important factor affecting SMEs' decision to implement GSCM. Vachon and Klassen [26] determined that the adoption of ISO was important. Muduli et al. [16] has categorized hindrances in four main categories: information deficit (top management awareness of new technology, workers' awareness of danger, etc.), lack of social pressure (customer and market pressures), weak legislation (government) policies, standardization) and capacity constraints (financial restrictions). Similarly, Mathiyazhagan et al. [27] analyzed the barriers to implement GSCM in the Indian automotive industry. Using Delphi technique, they found that reducing environmental hazards is a strong motivation for a firm to adopt GSCM. Moreover, their research supported the role of market image in the implementation of GSCM, while the findings of their research did not support the role of the government in motivating an industry to adopt GSCM. The automotive industry is the main industry in Malaysia with a support chain. More than 10% of the total work force is employed within this industry. Stakeholders and regulatory agencies are putting pressure on automotive industries to ensure sustainability due to increased concern about environmental pollution. Consequently, Malaysia is placing emphasis on the economic development and at the same time, it is trying to emphasize on environmental and social protection. These forces created a balance of on the economic, environmental and social performance of companies) [29]. For this reason, green initiatives and policies should be developed for any company to overcome these challenges and ensure sustainability.

The GSCM concept is relatively fresh in Malaysia. The recent literature has shown that the researcher's silent absence from the GSCM's adoption and its work on implementation as a developing country in the context of Malaysia. Eltayeb et al. [29] acknowledged four key determinants for green supply chain are rules, customer necessities, anticipated business improvements and social accountability. They examined the association between GSCM and their outputs and noticed key creators (eco-design) with optimistic outcomes on four output types (environmental, economic, cost reduction and non-material consequences). GSCM not only backings the goals and evidence sharing of a company, it also backings a company to better meet and meet customer needs according to its competitors. Managers face many barriers to the implementation of GSCM. Implementing GSCM in a developing country like Malaysia is still seen as a major problem due to several barriers. It is imperative that all managers understand these barriers and try to minimize them and increase their competitive power.

3 METHODOLOGY

3.1 Questionnaire design

Deliberations with GSCM experts and associated literature have helped to design the survey questionnaire that is considered to be the most appropriate data collection method. The questionnaire has two parts, such as Part A and B. In part A, the respondents were asked about the basic information of the company and their personal information. In part B, respondents were asked about their perception regarding the barriers to implementing the GSCM. The items of perceived barriers were adapted from previous studies [30, 31] to guarantee content validity. In addition, the survey presentation letter clarified the GSCM concept briefly and the purpose of the survey. In this study, a stratified sampling method was conducted. The sample is characterized by company size and organization to generate various sample frames. Random sampling was performed at each level.

The sampling framework of this study covers all companies that produce raw materials, parts, tools and spare parts in Malaysia's automotive supply chain industry. List of samples was taken from the Malaysian Automotive Association web site. At present, there are four producers of commercial and passenger vehicles such as Proton, Perodua, Naza, and Modenas. There are also nine automotive vehicle installers and 343 parts or parts manufacturers in the country. The total number of firms on the list is 356. The survey is directed at all companies. This work focuses on engineers, production managers, quality managers, executive directors and CEOs of Malaysian automotive companies. The survey was conducted via an e-mail configured for the relevant participant of each company. A total of 145 useful responses were received from 356 distributed surveys.

A ranking was made using the Problem Conflict Index (PCI) to identify critical barriers that hindered automotive companies to implement GSCM. It was measured by using a four-point rating scale. Thirteen barriers on different aspects of implementation of GSCM were identified from the literature [13,16,19,32,33] to measure the most problematic barriers of the automotive industry after consultation with concerned experts, researchers and reviewing available resources. For each problem, score of 3, 2, 1 and 0 were assigned to indicate high problem, medium problem, low problem and no problem at all respectively. The problem confrontation score was computed for each respondent. The possible range of total score for 13 problems could be 0 (zero) to 39, while '0' indicating no problem confrontation and '39' indicating high problem confrontation in automotive industry. To identify the most important barrier, problem conflict (PCI) was computed using the following formula:

$$PCI = P_h * X_3 + P_m * X_2 + P_l * X_1 + P_n * X_0 \quad (1)$$

Where,

PCI = Problem Confrontation Index



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P_h = Number of company who graded the constraint as high

P_m = Number of company who graded the constraint as medium

P_l = Number of company who graded the constraint as low

P_n = Number of company who graded the constraint as no problem

3.2 Description of respondents

Participants in the survey not only include all manufacturing companies that have implemented GSCM but also those that have not yet implemented them. In this context, in this study, the number of full-time employees was used to set the size of the company. Malaysian industries defined small businesses as organizations with fewer than 150 employees, medium enterprises as organizations with employees between 150 and 500, and large companies as organizations with more than 150 employees [33]. It was seen that 37.2% of respondents from the survey did belong to medium-sized company, 31% came from small company and 31.8% of big company. The survey also reported that 51.6% of companies surveyed belong to local companies. In addition, 25.8% of companies are totally foreign owned, and the remaining 22.6% are joint ventures.

4 BARRIERS OF AUTOMOTIVE INDUSTRY TO IMPLEMENT GSCM

The barriers to the implementation of GSCM in the automotive industry were ranked according to PCI and presented in Table 1. Table 1 reports that the number one barrier in the automotive sector is "market competition and uncertainty" with a PCI of 298. The second problem is "Lack of Implementing Green Practices" with the PCI of 297. Like these two barriers, cost implications, unawareness of customers, lack of corporate social responsibility, lack of globalization, lack of technical assistance from government have been identified as top level barriers and lack of the government's willingness to invest, reduced involvement in environmentally related conferences are identified as most important bottom level barriers. Removal of these barriers will be help in implementing GSCM in Malaysian automobile industry.

5 RESULTS & CONCLUSION

The aim of this study is to examine the most important barriers the automobile industry faces in implementing GSCM. The results of the study report that market competition and uncertainty is the number one obstacle in the automotive sector. The automobile industry can come up from this obstacle by improving its technology, its raw materials and its products. They have to reduce their high dependency on the local market and technology agreement at the regional and global scale. Despite the moderate effects of the current global crisis, Malaysia's automotive industry is not significantly exported, it is only a temporary relief, but the ability to earn during the crisis is declining, domestic

demand is declining and the automotive industry's brightness performance continues.

Table 1: Barriers to Implementation of GSCM

Barriers to Implementation of GSCM	Degree of barrier					
	No problem (Pn)	The low problem (Pl)	Mode moderately Problem (Pm)	Highly problem (Ph)	*PCI	Rank
Market Competition and Uncertainty	15	123	7	0	298	1
Lack of Implementing Green Practices	15	122	8	0	297	2
Cost Implications	14	123	8	0	296	3
Lack of awareness	16	118	11	0	295	4
Lack of corporate social responsibility	11	123	11	0	290	5
Lack of globalisation	13	117	15	0	288	6
Lack of technical assistance from government	16	110	19	0	287	7
Lack of foreign customers	15	110	20	0	285	8
Leniency in enforcing GSCM by parent companies	14	111	20	0	284	9
Lack of merging of quality and environment	14	114	12	1	282	10
Lack of ISO implementation	13	109	23	0	280	11
Lack of the government's willingness to invest	11	113	20	1	279	12
Reduced involvement in environmentally related conferences	12	110	23	0	278	13



The second problem identified by the respondents is lack of implementing green practices. In order to overcome this obstacle, the Malaysian government may report some additional benefits to organizations that follow green practices. The application of government policies to green practices will generate greater governance. IT activation will reduce many paper jobs that will further reduce the need to cut trees. Support from top management is required. The activation of IT will also help in the fast and effective communication between the members of the supply chain to the authorized GSCM.

The third problem identified by the respondents is cost implication. It is the government's responsibility to reduce the costs of the disposal of hazardous solid waste, reuse and recycling of used materials. Also, government can reduce the cost by motivating the firms to introduce innovative green practices, encourage innovative design and initiate new market opportunities.

In conclusion, it can be suggested that regular training programs can be implemented to raise awareness of green practices that will help institutions to adopt and encourage. Likewise, the commitment of top management is required to encourage the implementation of current technological developments in green practices. The government should take the initiative to raise awareness about organic products and how they can help them. Special advertising campaigns and welfare programs can be carried out to increase the level of knowledge of the clients. Organizations can advertise green products to create awareness among customers.

ACKNOWLEDGEMENT

This project has been developed with the financial support of the RIGS project (Project ID: RIGS16-360-0524), Research Management Center, International Islamic University Malaysia.

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