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Challenges of Green Supply Chain Management in Malaysia

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ABSTRACT

With the deterioration of global warming, Green supply chain management (GSCM) has received growing attention in the last few years. Green supply chain management (GSCM) is integrating environment thinking into supply chain management which able to reduce the environmental issues. However, there are many challenges faced by electronics industries when implementing the GSCM. This research attempts to determine the main challenges faced by electronic industries when implementing GSCM. This study was carried out at several electronic industries which implement GSCM in Peninsular Malaysia. The method that used to conduct this research is qualitative and quantitative method with interview a top management in 5 selected electronic companies and distribute questionnaire to 48 respondents in several electronic industries. Qualitative data collected was analyzed by manual analyzing as following process: data reduction, data display and conclusion drawing. The quantitative collected data was analyzed by using Analytic Hierarchy Process (AHP). It is utilized for ranking of these challenges. All pair comparisons in AHP have been made on the basis on the experts' opinions. The results of survey questionnaire and interview were reliable. From the result, the identified challenges were ranked. The quantitative result showed that the implementation cost, government, awareness of customer, information, resources or expertise, supplier commitment and top management commitment are the main challenges faced by electronic industries when GSCM implementation. The qualitative result is similar to quantitative result but public awareness, worker commitment are also the main challenges faced by the electronic industries. Thus, the research objective has been achieved.

INTRODUCTION

In recent years, public becomes more aware of environmental issues. Major current environmental issues may include weather change, pollution and resource depletion. Handfield *et al.* (2004) stated that because of each action of suppliers, manufacturers and traders has the potential to generate a harmful impact on the environment, companies should create environmental initiatives along the whole supply chain, including from raw material acquisition to delivery finished goods to customers so that sustainable development can be contributed.

Due to increased awareness of environmental issues in the recent years, the green supply chain has been broadly applied by industries. Hsu & Hu (2008) described that Green Supply Chain Management (GSCM) can improve the performance of the process and products according to the needs of the environmental regulations. In the last few years, GSCM has appeared and deal with the whole phases of product's life cycle (Borade & Bansod, 2007).

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However, there are many challenges to implementing GSCM for industries. There are many aspects with Hilton (2000) that agreed by Crals and Vereeck (2005), indicated that SMEs face a lot of challenges in taking environmental concerns into consideration in their production, such as the scarceness of resources, time, money, capabilities, skills and knowledge and etc.

Literature Review:

Supply Chain Management (SCM):

Supply Chain Management is a combination of planning, analyzing, coordinating and scheduling of every actions participated in “sourcing and procurement, conversion and logistics management activities” (Council of Supply Chain Management Professionals, 2008). For the purpose of satisfying the final customers of the supply chain, SCM need the combination and cooperation of business processes and strategy alignment throughout the supply chain (Green *et al.*, 2008, 2006; Cohen & Roussel, 2005; Ho *et al.*, 2002).

Green Supply Chain Management (GSCM):

For over a decade, concern in sustainable supply chains has been increasing in the literature (Pagell & Wu, 2009). Therefore, there are some organizations have implement Green Supply Chain Management (GSCM). According to Industry Canada (2013), clarified that “legal business plan should be support and do more investments in GSCM.” Dheeraj & Vishal (2012) also stated that environmental improvement is a main aim for an organization. Thus, GSCM is the best choice for them because it is to develop by adapting environmental concerns with the traditional supply chain management concepts.”

GSCM is able to reduce the environmental issue. Based on Olugu *et al.* (2010), mentioned that GSCM is to remove or reduce the waste in the form of hazardous chemicals or energy. Green supply chain management is:

- (1) Minimizing energy consumption;
- (2) Minimizing consumption of natural resources;
- (3) Minimizing pollution-related problems; and
- (4) Strengthening recycling to harness the further use of raw material and supply.

GSCM vs. Traditional SCM:

Table below showed the differentiation between GSCM and SCM.

Table 2.1: Differentiation of GSCM and SCM

Characteristics	GSCM	Traditional SCM	Researcher
Objectives	Ecological and Economic	Economic	Beamon (1999)
Ecological Optimization	High Ecological Impacts	Low Ecological Impacts	Gilbert (2000) Ho Johnny <i>et al.</i> (2009)
Supplier Selection Criteria	Ecological Aspects Long term relationship	Price Switching suppliers quickly Short term relationship	
Cost Pressure	High	Low	
Flexibility	Low	High	
Speed	Low	High	

Benefits of GSCM:

Advantages can be classified into two main titles; Environmental and Business (Runala Jaggernath, 2015).

Table 2.2: Benefits of GSCM

Advantages	
Environmental	Business
Improvement in energy saving	Competitive advantage
Decrease in pollution and waste	Reduced cost and increases profitability
Water preservation	Access to foreign markets
Increased energy efficiency	Improved customer service
Decrease in toxic chemical released	Improved inventory
Reduced GHG emissions	Refined reverse logistic

Challenges to GSCM Implementation:

Recently, the green supply chain has been broadly applied by organizations because of growing attention of environmental problems. Anyhow, there are challenges to implementing GSCM for industries. In 2011, Luthra *et al.*, market competition and trouble; insufficient of implementing green practices; fund implications; unawareness of customers have been identified as top level challenges and insufficient of government support systems which is the most important bottom level challenge. Walker *et al.* (2008) has comprised in his paper internal and external challenges to apply GSCM. These challenges categories have comprised funds, insufficient of resources as internal challenges. Exposing low environmental achievement, lack of awareness, poor rivalry, acquisition constitution and supplier's reluctance to change have been treated as external challenges.

Methodology:**Research Design:**

This research is using mixed method approaches, which is adopted quantitative approach by using questionnaire methods and qualitative approach by using interview methods for data gathering and analyzing. Quantitative research is related to numerical data and the accuracy of the research whereby the research is conducted in an experimental way to obtain numerical data for analysis by a statistical test. The statistical test analyzes the result from the relevant data in terms of numbers. Qualitative research is designed to make possible analytic generalizations (applied to wider theory on the basis of how selected cases 'fit' with general constructs), but not statistical generalizations (applied to wider populations on the basis of representative statistical samples) (Curtis *et al.*, 2000). According to Cresswell & Clark (2007), the mixed method approaches has been chosen to provide a better understanding of research problems than either approach alone.

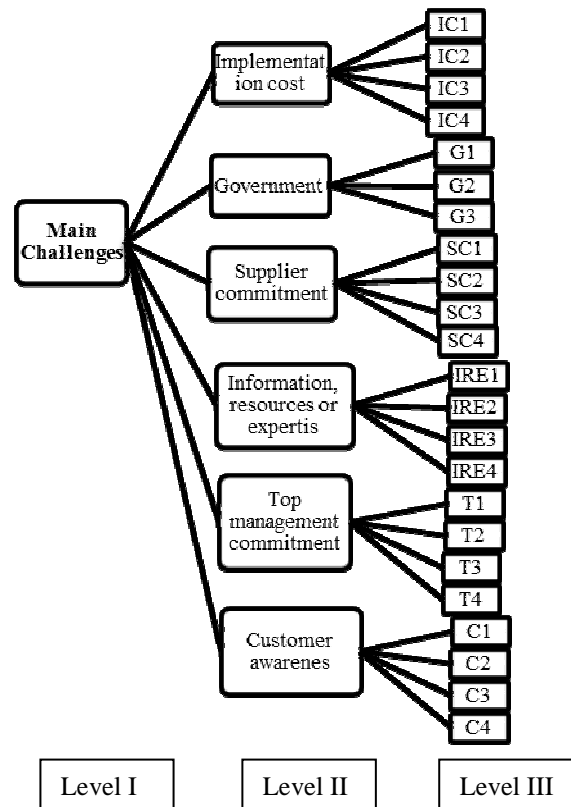


Fig. 3.1: AHP framework for identifying essential barriers of GSCM implementation.

Level-I: The objective/overall goal.

Level-II: This level represents the challenges category.

Level-III: This level of the hierarchy contains specific challenges

Data Analysis And Results:**Result of Consistency Ratio (CR):**

Data were collected using survey questionnaire method to determine the main challenges faced by electronic industries when implementing Green Supply Chain Management (GSCM). According to Saaty (2006), consistency ratio must be lower than 0.1. If the value is higher than 0.1, it means the data are not reliable and the researchers must discard all of the unreliable data and collect again. Hence, this research indicated that the data collected were reliable, validity and trustworthy. This is because all the criteria's consistency ratio is less than 0.1. The main criteria's consistency ratio is 0.07.

Table 4.1: Consistency ratio (CR) of the main criteria

No.	Main Elements	Consistency Ratio
1	Implementation Cost	0.07
2	Government	
3	Supplier Commitment	
4	Information, Resources or Expertise	
5	Top Management Commitment	
6	Customer Awareness	

Priority of order:

Table 4.2 showed the priority of order in main criteria based on local weight which also known as normalized weight.

Table 4.2: Priority of order in main criteria

Rank	Main criteria	Local weight (Normalized weight)
1	Implementation cost	0.362
2	Government	0.228
3	Customer awareness	0.211
4	Information, resources or expertise	0.098
5	Supplier commitment	0.065
6	Top management commitment	0.037
	Total weight	1.000

Based on the table 4.2 above, the most of the respondents agree that the main criteria of the challenges of GSCM are implementation cost (0.362). The second highest is government (0.228) followed by customer awareness (0.211), information, resource or expertise (0.098), supplier commitment (0.065). The least main criteria among these is top management commitment (0.037).

Global weight set of main criteria and sub-criteria:

The table 4.3 showed the global weight of main criteria and sub-criteria in challenges of GSCM. Based on the table below, the most important criteria was implementation cost (0.362), followed by government (0.228), customer awareness (0.211), information, resource or expertise (0.098), supplier commitment (0.065) and top management commitment (0.037).

Table 4.3: Global weight of main criteria and sub-criteria

Main Criteria (weight)	Sub-criteria	Local Weight	Global weights(Rank)
Implementation cost (0.362)	high investment low return	.282	.104 (2)
	financial constraint	.080	.030 (10)
	high cost for disposing hazardous waste	.213	.079 (6)
	high cost of switching to new system	.425	.157 (1)
Government (0.228)	enforcement not strong	.637	.099 (3)
	products conflict with green policy	.105	.016 (18)
	lack of support and guidance	.258	.040 (9)
Customer awareness (0.211)	low eco-friendly product demand	.169	.042 (8)
	do not know about green product and its benefits	.096	.024 (13)
	more concern on price	.368	.091 (4)
	unwilling to pay more for green product	.368	.091 (5)
Information, resource or expertise (0.098)	lack of technical expertise	.409	.043 (7)
	incapable of switching to new systems	.241	.025 (12)
	non-availability of appropriate technology	.175	.018 (16)
	inability to get correct feedback	.175	.018 (17)
Supplier commitment (0.065)	unwilling to exchange environment	.086	.007 (22)
	traditional mindset	.291	.024 (14)
	not easy to measure and monitor suppliers' environmental practices	.333	.028 (11)
	neither train or reward suppliers	.291	.024 (15)
Top management commitment (0.037)	lack of participation in seminar	.282	.011 (20)
	resistance to change existing investment, information systems and habit	.080	.003 (23)
	lack of awareness of environmental impact on their business	.213	.008 (21)
	restriction in information flow	.425	.016 (19)

Qualitative Analysis:

This sub-section will be focused on the result obtained from an interview with 5 respondents. The respondents are manager from 5 electronics companies. From the result, we can analyze the frequency of the theme appeared in the entire interview.

Interview Result:**Analysis of interview questions: Comparison between respondents:**

The analysis of comparison as below:

1. What are the challenges faced while implementing GSCM?

Table 4.4: Table of analysis of question 1

Challenges	Company faced	Frequency	Rank
Public awareness (People awareness, Worker awareness, Customer Awareness)	A, B, C, D	4	2
Cost	A, B, C, D, E	5	1
Government	A, B, C, D, E	5	1
Information, resources, expertise	A, B, D, E	4	2
Top management commitment	B, D	2	3
Worker commitment	C, D	2	3
Supplier commitment	C, E	2	3

The challenges of Company A faced are public awareness which include people awareness, worker awareness and customer awareness, cost, government, information and resources or expertise. In Company B, they faced the challenges such as public awareness, cost, government, information, resources or expertise and top management commitment when implementing GSCM.

Furthermore, there are more challenges faced by Company C, which are public awareness, cost, government, worker commitment and supplier commitment. In Company D stated that the worker commitment is low, top management and government is not enforced, lack of information, resources or expertise, public awareness and implementation cost is high. Last but not least, the challenges that faced by Company E are cost, government, information, resources or expertise and supplier commitment.

Hence, based on table 4.4, the first main challenges that faced by electronic companies are cost and government which have been faced by all the electronic companies that I interviewed. Secondly, there are 4 out of 5 companies agreed that public awareness and information, resources or expertise are the main challenges when they implementing GSCM. Lastly, there are only 2 out of 5 companies agreed that top management commitment, workers commitment and supplier commitment are the main challenges.

2. Do you agree that implementation cost, government, supplier commitment, information, resources or expertise, top management commitment and awareness of customer are the main challenges faced by industries when GSCM implementation?

From the table 4.5, company A, D and E are agreed that implementation cost, government, supplier commitment, information, resources or expertise, top management commitment and awareness of customer are the main challenges faced by industries when GSCM implementation. The perception from company B and C, they are only partially agreed on that.

Table 4.5: Table of analysis of question 2

Company	Result
A	Agree
B	Partially Agree
C	Partially Agree
D	Agree
E	Agree

Discussions, Suggestions And Conclusion:

Discussion of the findings:

Quantitative findings:

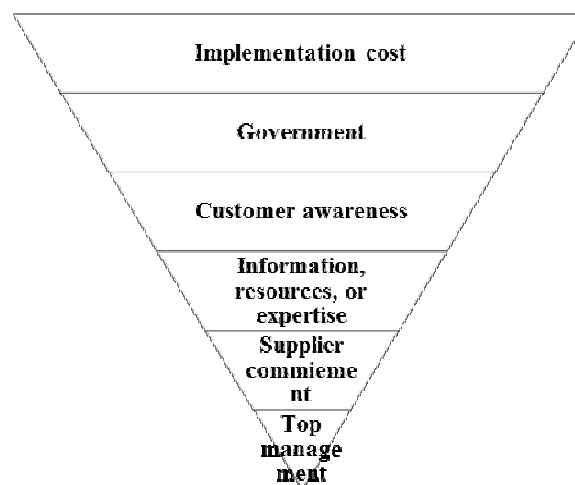
**Fig. 5.1:** Ranking of GSCM challenges in Electronic Industries

Figure 5.1 showed the ranking of GSCM challenges. Through this survey, the main challenges which follow the ranking are implementation cost, government, customer awareness, information, resources or expertise, supplier commitment and top management commitment. The first 2 sub- criteria is high cost of switching to new system and high investment low return which is under the category of implementation cost.

Implementation cost is a main challenge for GSCM because when implementing GSCM, the companies need to invest a lot of new equipment, hire expertise, and giving training, all these are related to cost. Cost is a very important criteria in organization. Increasing in cost will lead to lower profits. All this investment are low return. From the previous study, it showed that there are high investment requirement by green methodologies such as green design, green manufacturing, green labeling of packing etc. (Hosseini, 2007; Mudgal *et al.*, 2009; AlKhidir *et al.*, 2009). Besides, Mudgal *et al.* (2010) stated that a significant financial barrier to environmental technology improvement is the effect of collection and treatment costs and prices to dispose of hazardous materials.

Besides that, government institutions are another challenges due to development in the environmental management in the sense that institutional process for implementing GSCM are going on but very limited institutional support is given for new ideas to implement GSCM. In previous study, government is not making industry friendly policies toward GSCM and not giving special benefits to those organizations implementing GSCM (Hosseini, 2007; Yu Lin *et al.*, 2008; Hsu *et al.*, 2008; Mudgal *et al.*, 2009; Mudgal *et al.*, 2010; Srivastva, 2007).

There are also unawareness of customers which means customers do not know about green products and their benefits (Mudgal *et al.*, 2009; Ravi *et al.*, 2005; Zhu *et al.*, 2004; Zhu *et al.*, 2007; Zhu *et al.*, 2008). In Peninsular Malaysia, there are a lot of companies think that the customer awareness is not care about green, do not understand about green products and unwilling to pay more for green products. Thus, the customer awareness is very low.

Furthermore, there are a lot of companies will facing the same problem when implementing GSCM which is lack of information, resources or expertise. Based on Perron (2005), a lot of companies faced one of the main challenges which is lack of technical expertise. Small-scale mine owners of the industrializing countries such as India is shortage of the technical capabilities regarding proper exploitation, mining development, mineral extraction, or processing. Ghose (2003b) stated that they also usually have insufficient mechanical equipment and inadequate maintenance facilities which reduce output per unit input and increases waste production (Das, 2009).

Moreover, the supplier commitment is another challenges that faced by companies when implementing GSCM. There are some of the suppliers are reluctance to change towards GSCM (Hsu *et al.*, 2008; Kannan *et al.*, 2008; Lettice *et al.*, 2010; Ravi *et al.*, 2005; Srivastva, 2007; Sarkar *et al.*, 2006). This may due to some of the suppliers cannot afford the high investment of green implementation. Besides that, the companies think that it is difficult for them to monitor their suppliers. Mathiyazhagan *et al.* (2013) found that monitoring or measuring suppliers' environmental performance is a difficult process.

Last but not least, in an organization, there is lack of top management commitment; it is because GSCM is not the core business activity (Digalwar *et al.*, 2004; Sarkis, 2009; Mudgal *et al.*, 2009; Zhu *et al.*, 2007). They may think it is not important to have green supply chain. The attitude of top manager is also one of the main challenges. Most of them are refusing to change to green due to the laziness or cost problem. Indian small-scale mines especially the very small industries normally do not bother about eco-friendly operations. They not only destroy accidentally the vegetation and the trees, particularly at and near the area of mining operation, but also do not take any step to regenerate environmental status or create greeneries (Das, 2009).

Qualitative findings:

The objective of this study is achieved by using interview method. Through the interview surveying with 5 managers, in previous section, based on table 4.4, the main challenges faced by the electronic companies are the cost. There are 5 out of 5 companies agreed that cost of implementing green supply chain is high. This is because when implementing green supply chain, the companies need to change the new technologies, do lab test for materials, audit the suppliers and etc. All these are costly to an organization. It is very important for an organization to control the cost. High cost will lead to lower profit which every company does not wish this to be happened. The previous study also shows that in the beginning of implementing GSCM, the cost of switching to new system is high (Mudgal *et al.*, 2010). Moreover, all the interviewees also agreed that government is another main challenge while implementing GSCM. It is because government does not strongly enforce and commit GSCM. Most of the companies that I interviewed are multinational company and based in Japan. Interviewees have stated that the enforcement is from their Japan Headquarter but not from the government. Government is lack of support and commit to green supply chain. From the previous study, Massoud *et al.* (2010) have also confirmed that "lack of government support and incentive" is a significant barrier to acquiring an environmental certificate. Thus, it is acceptable and reasonable that cost and government are the first main challenge faced by the companies.

Besides that, there are 4 out of 5 companies agreed that public awareness including people awareness, worker awareness, customer awareness are one of the challenges; this is because most of the people do not understand about green concept. Most of them will be prefer on cheaper product instead of green product. Most of them do not put the green concept in priority. From the previous research study, out of 28 professionals that answered the question, 26 professional agreed that lack of public awareness is an extreme barrier (Elizabeth Ojo *et al.*, 2014). It shows that public awareness is a very important factor to make the GSCM become more challenging. Another main challenge is information, resources or expertise which faced by 4 out of 5 companies. Most of the companies are lack of information, resources or expertise. They do not have the information to teach their employees and do not have an expertise to guide them. From one of the respondent feedback, GSCM is something new in Malaysia because the concept of GSCM was first adopted from oversea. After a long time, the local companies are just started to apply this concept in the organizations mostly are because of the ISO 14000 requirement. Thus, they need to look for the information, get the resource, hired or invite the expertise from the other developed countries to teach and guide their employees about the GSCM.

Last but not least, the third ranking of GSCM challenges is supplier commitment, worker commitment and top management commitment. There are only 2 out of 5 respondents saying that these are the challenges. For the supplier commitment, one of the respondents saying that some of the small suppliers may not able to commit what the organization request to do is due to the cost is high. Thus, there is lack of an environmental partnership with suppliers for an organization (Hamner, 2006; Wolf & Seuring, 2010). Workers do not commit to the GSCM implementation is because of their awareness is low. As I mentioned above, the public awareness is the extreme barrier. The public awareness is including the worker awareness. If the workers do not understand about the green, they will think that green is an extra work to do and refuse to follow the instructions of companies. For the top management commitment, actually the top management is committed, they understand the green concept. However, they do not encourage involving and strongly adopting the GSCM. They will think that their core businesses are to produce product and earn profit. Therefore, they will more focus on profit but not on green supply chain. From the previous study, it also proved that there is lack of top management involvement in adopting green supply chain management (Emiliani, 2010; Hsu & Hu, 2008).

Conclusion:

As a conclusion, this research study able to identify the main challenges faced by industries while implementing GSCM. It able to achieve the objective stated and answered the research question. It can be concluded that the main challenges that electronic industries faced are implementation cost, government, customer awareness, information, resources or expertise, supplier commitment and top management commitment.

Regarding the results obtained, GSCM implementation in industries is crucial. It is requires coordination from all level of the workforce, from bottom-line employee to top management. The public awareness is also important for a successful GSCM. If people do not understand the GSCM, it is hard to implement. Government should also provide strong enforcement so that the GSCM can implement effectively. Without the fully commitment from all of the people who involve in the supply chain, it is difficult to attain an effective GSCM.

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