

## Critical Success Factors in Implementing Green Supply Chain Management in a Malaysian Automotive Firm

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### Abstract

This study was conducted to identify the critical success factors (CSFs) in implementing Green Supply Chain Management (GSCM) in an Automotive Manufacturer in Malaysia. The objectives of the study were to identify (i) the critical success factor influencing GSCM implementation (ii) the barriers influencing GSCM implementation. A case study approach was employed in this research. Descriptive analysis method based on mean was used to identify the critical success factor in adopting GSCM and the barriers in adopting GSCM. Questionnaire with a five Likert scale was used to collect data and it was responded by a total of 280 employees from case study company. The result of the study shows that top management commitment is the most critical success factor for effective adoption of GSCM practices.

**Keywords:** Green Supply Chain Management, Critical Success Factors, Barriers, Automotive

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### Introduction

Critical Success Factors (CSFs) are activities that can ensure successful competitive performance for organizations if their results are satisfactory. Thus, they should be identified, monitored, analyzed, and effectively dealt with in order to achieve continuous improvement (Rockart, 1979; Boynton & Zmud, 1984; Leidecker & Bruno, 1984; Hu & Hsu, 2010).

Organizations are becoming increasingly interested in managing corporate social responsibility and sustainability as part of their operations management (Walker *et al.*, 2008). Environmental management in supply chains (Green Supply Chain Management - GSCM) emerges as a systematic tool since it help integrates environmental management principles with supply chain management activities allowing organizations to reach their profit and market growth objectives and improve environmental efficiency (Muduli *et al.*, 2013). However, there are many factors that still obstruct the adoption of GSCM by companies (Testa & Iraldo, 2010). Thus, the identification and assessment of CSFs are of great vital for the adoption of GSCM practices because if the CSFs are not well managed, they can become barriers that can influence and impede successful implementation of GSCM practices (Muduli *et al.*, 2013; Govindan *et al.*, 2014). Malaysian fully owned firms have the lowest level of participation in the Green Supply Chain (GSCM) compare to foreign based companies (EITayeb *et al.* 2009). One of the reasons that Malaysian owned firm having the lowest participation in GSCM is because it is still a very new concept in Malaysia (Green Purchasing Network Malaysia, 2003). According to Goh and Zailani (2010), with the increasing trend of global environment protection awareness, manufacturing industry in Malaysia will be out of the competition if green initiatives is not adopted in their business strategy. The empirical studies on GSCM are considered low as the critical success factor (CSFs) for GSCM adoption is not given importance attention in the

previous studies (Chien & Shih, 2007; Hsu & Hu, 2008; Srivastava, 2007).

Numerous literature on CSF has focused on the investigation of CSFs for the adoption of ISO 14001 environmental management system (EMS) in organizations in many countries (Quazi, 1999; Hui *et al.*, 2001; Babakri *et al.*, 2003; Zutshi & Sohal, 2004; Sambasivan & Fei, 2008). The main results show that if the CSFs are not decently managed, they can become a barrier to GSCM adoption. Several studies have attempted to relate CSF with GSCM, such as studies conducted by Hu & Hsu (2010), Kim & Rhee (2012), Ab Talib & Muniandy (2013) and Luthra *et al.* (2014). However, the aim of this study to identify the CSFs for GSCM practice adoption and identify the barriers that lead to the unsuccessful GSCM implementation.

Therefore, this study aims to identify the CSFs and barriers in implementing GSCM practices in an automotive manufacturer in Malaysia. A case study was carried out at an automotive manufacturer in Pahang, Malaysia.

### Literature Review

In this article, we identify dimensions of critical success factors and barriers in implementing GSCM.

### Green Supply Chain Management (GSCM)

The major study conducted by Srivastava (2007) highlights that GSCM adds the green component to Supply Chain Management (SCM) to address the influence and relationships between Supply Chain Management and the natural environment. GSCM can reduce the environmental issue of production activities through the transformation of paradigms and generate profits through the balance between economic and environmental sustainability in organizations (Rao & Holt, 2005; Zhu *et al.*, 2007). GSCM can contribute to sustainability performance enhancement, and thus it is an alternative for companies

to rethink their current mode of production (Alves & Nascimento, 2014).

GSCM practices are not easy to adopt and implement due to the presence of many internal and/or external barriers. In depth understanding of these barriers will assist organizations to prioritize better and manage their resources efficiently and effectively (Walker *et al.*, 2008; Mudgal *et al.*, 2010; Luthra *et al.*, 2011).

The level of success of GSCM implementation is clearly influenced by the type and magnitude of barriers. Hence, organizations need to be able to remove and reduce the main barriers and identify factors and sub-factors that impede GSCM implementation and will thus become barriers (Muduli *et al.*, 2013; Govindan *et al.*, 2014). Identifying and assessing the CSF for implementation of GSCM practice is therefore vital.

### Green Supply Chain Management in Automotive Industry

Sustainable management is a vital issue in the supply chain. Numerous studies have attempted to explain the development of environmentally friendly products or processes (one of the dimensions of sustainable development) calls for a unified effort in the supply chain, which depends on the contribution and commitment of all actors in the chain, both upstream and downstream and strategic alignment so that the environmental issues result in effective gains (Gerrard and Kandlikar, 2007; Hervani *et al.*, 2005; Gold *et al.*, 2010). According to Sarkis (2003), in order for the supply chain to reach satisfactory environmental performance, many environmental actions need for supplier participation, such as:

- programs for reducing or eliminating materials used in the production process;
- programs that focus on environmental conformity in suppliers' operations; and
- joint development of new materials, processes or other solutions for reducing the environmental impact.

GSCM arise as an organizational philosophy to help organizations and their partners reach their objectives, such as profit and market share, reducing environmental issue or risk and impacts and improving environmental efficiency (Figueiredo and Mayerle, 2008; Kuik *et al.*, 2011; Zhu *et al.*, 2008).

As stated by Srivastava (2008), GSCM can be defined as the integration of environmental considerations in SCM, including product design, the selection and outsourcing of materials, manufacturing processes, delivery of the final product to consumers and managing the disposal of the product at the end of its life cycle.

The implementation of GSCM practices depends on numerous driving factors and internal and external pressures (Xu *et al.*, 2013). Hall (2000) pointed that the external pressure (on the organization) is one of the primary factors that affect the execution of GSCM. Following this train of thought, Zhu and Sarkis (2007) found that companies that face more regulatory pressures tend to adopt GSCM more quickly. In turn, there are numerous barriers that lead to implementing GSCM, among them are the cost of implementation and technological barriers (Jalali Naini *et al.*, 2011) and the qualification of suppliers (Thun and Muller, 2010) are the most considered.

Chiou *et al.* (2011) emphasize that to bring about the greatest integration among the GSCM practices in the automotive industry, it is essential to understand the impacts and relationship. In particular with regard to suppliers and green innovation processes for in depth understanding the relationship and impact on environmental performance and competitive advantage.

### Critical Success Factors (CSFs)

Critical Success Factors (CSFs) are areas of activities that need to be carefully managed to ensure the attainment of organizational goals (Rockart, 1979). The identification of CSFs provide a means for organizations to assess threats and opportunities in their environment. It can also provide a set of criteria to evaluate the strengths and weaknesses of the organization (Leidecker & Bruno, 1984). CSFs

include issues vital to the current operating activities of an organization and to its future success (Boynton & Zmud, 1984). This study was based on the CSFs that were established and validated in one of the most important studies on this topic (Wee & Quazi, 2005): top management commitment, total involvement of employees, information management, training, supplier management, and green product/process design.

Previous studies have proven successful GSCM implementation have shown that commitment, participation and leadership by top management are one of the most critical factors in organization influencing on GSCM implementation. There is a large volume of published studies describing the role of top management embarking in GSCM implementation. As identified by Andre *et al.*, (2017) the drivers of top management influence the most adoption of GSCM practice. The support given by top management can be a strong driver of successful GSCM implementation as they motivate employees and situate business goals with green environmental adoption from top to bottom (Dhull & Narwal, 2016).

According to Hu & Hsu (2010), the CFS "total involvement of employees" is related to GSCM practice "internal management" due to the requirement for cross-functional integration of employee representative in ensuring good cooperation, which leads to environmental improvement. Based on the findings of Mauricio *et al.* (2017), cross-functional teams refer to employee participation in the actual implementation of improvement and suggestion for any improvements. Nevertheless, the lack of cross-functional relationship can impede the sustainability concerns into the supply chain (Sarkis, 2012).

According to Mauricio *et al.* (2017), the CSF "information management" is related to the GSCM practice of "internal environmental management". According to Zutshi & Sohal (2004), IM and internal and external communications between the organization and its partners were important to successfully implement GSCM. Therefore IM is also related with the GSCM practice of "internal environmental management" (Hu & Hsu, 2010). Referring to Sarkis (2012), suppliers can intentionally create barriers to information sharing due to competitiveness, which can reduce their real information availability.

According to Zutshi & Sohal (2004), learning and training of all employees is absolutely critical to the success of GSCM adoption. Initially, many organization encounter challenges when implementing green initiatives related to GSCM practice. Thus, environmental awareness should be spread first in the organization so that all employee become aware of how GSCM concept would change the image of the firm to the better. This view has also been highlighted and supported in the literature by researchers Hu & Hsu (2010). Various training in green issues need to be launched in order to promote environmental awareness for both staff and suppliers. As such, both employees and suppliers should be motivated enough in order to take this green approach more serious and to work hard to success in GSCM adoption.

The CSF "supplier management" is related to the GSCM practice "green purchasing" through the following strategies proposed by Hu & Hsu (2010): supplier meeting, self-assessment questionnaire, environmental audit for suppliers, compliance statement, product testing report, establishment of environmental requirements for purchasing items, collaborative research and development with suppliers, and selection and evaluation of suppliers. The establishment of procedures for supply management and supplier engagement is necessary for the assessment and reduction of environmental impacts, waste tracking requirement, and requirement for suppliers to implement GSCM (Sarkis, 2012).

The CSF "green product/process design" affects the GSCM practice "eco-design" because the incorporation of the green issue into new product development (green design) is considered as a strategic method to reduce the environmental impacts of products and processes while stimulating cost reduction and increasing product marketability (Hu & Hsu, 2010)



**Barriers in implementing GSCM**

In addition to the CSFs of green supply chain management discussed before, there are some barriers that organizations are facing when implementing these sustainable systems. Industries have significant awareness about environmental issues and they encountered many barriers during the implementation of GSCM. Hence industries should identify barriers which need to be removed in the initial stages of GSCM adoption.

There is a large volume of published studies mentioned that the commitment, guidance, support and leadership from the top management will obviously impact the success of the firm’s environmental management practices and performance (Ojo *et al.*, 2014; Griffin *et al.*, 2004; Govindan *et al.*, 2014). Similarly, another major study conducted by Sharma (2000), Jayant and Azhar (2014), Kamaruddin *et al.*, (2013) have also supported that the role of top management are crucial in determines the proactiveness of a firm in environmental initiatives.

A number of studies have found a few elements that is categorize under the technological barriers for the firms to adopt GSCM. Local firm are usually slower in responds as compared to multinational companies to the newest trends of technology due to their lack of technical resources (Zhu & Geng, 2013; Al- Abady & Iman Nuwayhid, 2010). Similarly, Govindan *et al.*, (2014), Jayant and Azhar (2014) and Muduli *et al.*, (2011) studies also shows that technological barrier is the first barrier among other barrier that impede to the adoption of GSCM. In addition, Wooi and Zailani (2010) stated that technological barrier is the key barrier for the firms in Malaysian manufacturing sector in implementing GSCM.

Govindan *et al.*, (2014) demonstrated that financial resources are the fundamental in allowing the implementation of many environment practices and many other studies report this as one of the significant barrier. Additionally, Ravi & Shankar (2005) stated that financial is important to support the manpower and also infrastructure of any green practices. Govindan *et al.*, (2014) and Deepak *et al.*, (2014) further explains that these elements such as lack of finances, non- availability of bank loans, high cost of hazardous waste disposal and high investments in green practices will impede the implementation of GSCM.

There is a large volume of published research found that if there is lack of knowledge and information on environmental impact, it will lead to hinder of adoption of GSCM (Ojo *et al.*, 2014, Abdullah *et al.*, 2016, and Holzl and Janger, 2014). Sarkis *et al.*, (2011) then add that companies find difficulties in conveying environmental information and benefits to their stakeholders due to lack of knowledge of the green products and process.

**Methodology**

In this article, we discuss the case study approach, sampling design and data analysis technique.

This study employed a case study approach. According to Eisenhardt (1989), case study is a research strategy which focuses on understanding the dynamics present within single settings. Yin (1994, p. 13) defines case study as an empirical inquiry that investigates a contemporary phenomena within its real life context, especially when the boundaries between phenomenon and context are not clearly evident. In addition, case study methods allows investigators to retain the holistic and meaningful characteristics of real-life events (Yin, 2003). According to Van Donk and Van der Vaart (2005, p41), ‘The case study approach enables the links between two companies to really be explored, while looking at their (mutual) integrative practices’.

Voss *et al.* (2002) pointed out that case research is widely used in other management disciplines such as organisation strategy and in the broader field of social sciences such as ethnographic studies.

In addition, Voss *et al.* (2002) asserted that case research has consistently been one of the most powerful research methods in operations management, particularly in the development of new theory. These authors further agued that many breakthrough concepts and theories in operations management such as lean production have been developed through field case studies. Furthermore, Spens and Kovacs

(2006) pointed out that case studies are gaining in popularity in logistics research.

This study was conducted at a Malaysian automotive manufacturer located at Pekan, Pahang. The respondents of this study were the employees from all departments in the case study company.

Total number of employees at case study company are 3000 employees. Thus the population size of this study are 3000. The sample size of respondents was determined according to sampling table developed by Krejcie and Morgan (1970). Thus, the sample size of this study is 341. This study used simple random sampling technique.

Quantitative study was employed in this study. Thus, descriptive analysis was used to identify critical success factor and barriers of GSCM implementation in case study company as it provide better understanding to researcher. Besides, descriptive analysis is effective since it consists of numerous measurement tools such as mean, percentage, and frequency.

Overall mean score were categorize the factors into level based on mean score. The mean score range and the level were listed in Table 1.

**Table 1: Levels based on Mean Score Range**

Mean Score Range	Level
3.67 – 5.00	High Impact
2.34 – 3.66	Moderate Impact
1.00 – 2.33	Low Impact

**Results**

The sample size of this study are 341 respondents. However, only 280 respondents returned back the questionnaire, and the respond rate is 82.1%. Table 2 shows the summary of the CSFs for the variables of top management commitment. It can be seen that *transformational leadership is needed on environmental issues to communicate a clear and coherent environmental vision* is the most critical factor as it has the highest mean value in which 4.21. While *facilitates employee involvement through culture shift* has the lowest mean score of 3.46. The total mean score is in high level.

**Table 2: Mean Score of Top Management Commitment**

Question	Mean	Level
• Major department head feels high responsible for encourage the green vision in the company	3.85	High
• The top management do well in green improvement process	3.65	Moderate
• Transformational leadership is needed on environmental issues to communicate a clear and coherent environmental vision	4.21	High
• Facilitates employee involvement through culture shift	3.46	Moderate
• Commitment of GSCM from top managers is essential	4.18	High
<b>Total</b>	<b>3.87</b>	<b>High</b>

Table 3 shows the summary of the CSFs for the variables of total involvement of employees. From the table, it showed that *employees are encouraged to have a high commitment to participate actively in the organization* had the highest mean score with 3.56. While statement ‘the staff is not individualistic and always cooperate in caring out the task’ had the lowest mean score which was 2.92. All of the items show the moderate level of agreement among respondents.

Table 4 shows the summary of the CSFs for the variable of informational management. It can be seen ‘information management is important for the awareness and involvement of distributors, retailers and collection points’ and ‘the specific information should reach the customer in order to make them aware’ statements share the same highest mean score which was 3.91. While, *all processes and product information is available to all departments or units* had the lowest



mean score which was 3.05. The total mean score also show that the level of agreement that information management is the critical success factor in adopting GSCM is high.

**Table 3 :** Mean Scores of Total Employees Involvement

Question	Mean	Level
• Employee have the opportunity to make suggestion and to provide input in the company	3.43	Moderate
• Employees are encouraged to have a high commitment to participate actively in the organization	3.56	Moderate
• The employees are often actively involved in the company	3.14	Moderate
• The employee always supports each other	3.04	Moderate
• The staff is not individualistic and always cooperate in caring out the task	2.92	Moderate
<b>Total</b>	<b>3.218</b>	<b>Moderate</b>

**Table 4 :** Mean Score of Information System

Question	Mean	Level
• The information management between the organization and its partners is essential to successful implement GSCM	3.86	High
• Information management is important for the awareness and involvement of distributors, retailers and collection points	3.91	High
• All processes and product information is available to all departments or units.	3.05	Moderate
• The specific information should reach the customer in order to make them aware	3.91	High

Table 5 shows the summary of the CSFs for the variables of training. Among the items, statement “training programs give positive responses” had the highest mean score with 3.74. While the least mean score’s (2.97) statement was “policies and training plans are clear in determining the training required by employees. The items in this section show that CSFs of training is moderate.

**Table 5:** Mean Scores of Training

Question	Mean	Level
• Involvement in training ensures the development of work productivity	3.57	Moderate
• Training programs give positive responses	3.74	High
• Policies and training plans are clear in determining the training required by employees	2.97	Moderate
• All employees have the opportunity to undergo training	3.0	Moderate

Table 6 shows the summary of the CSFs for the variables of supplier management. Statement that had highest mean score (3.85) was “cooperation with suppliers for environmental objectives are essential”. While statement “all suppliers are prepared to share their real information availability” had the least mean score which was 2.62. All of the items show the moderate of agreement among respondents.

Table 7 shows the summary of the CSFs for the variable of green product/process design. From the table, it showed that *systematic method to reduce the environmental impact of product and process* had the highest mean score with 4.21. While statement “the GPD are often reach technical specification” had the lowest mean score which was 3.21. All of the items show the moderate level of agreement among respondents.

**Table 6:** Mean Scores of Suppliers Management

Question	Mean	Level
• Cooperation with suppliers for environmental objectives are essential	3.85	High
• Always take consideration of suppliers’ ISO14000 certification	3.0	Moderate
• All suppliers are prepared to share their real information availability	2.62	Moderate
• Supplier are encouraged to have a high commitment due to environmental issues	3.61	Moderate
• Provide annual workshops involving all suppliers.	2.99	Moderate
<b>Total</b>	<b>3.2129</b>	<b>Moderate</b>

**Table 7:** Mean Scores of Green Product/Process Design

Question	Mean	Level
• Systematic method to reduce the environmental impact of product and process	4.21	High
• Cooperation with customer for eco-design with special consideration for the environmental impacts of the product during its whole lifecycle	3.26	High
• Always considered green issue into new product development	3.26	Moderate
• The GPD are often reach technical specification.	3.21	High
<b>Total</b>	<b>3.485</b>	<b>Moderate</b>

Table 8 shows ranking of six CSFs in implementing GSCM. The results indicated that the *top management commitment (TMC)* get the first ranking with the mean score 3.87. Followed by the *information management (IM)* with mean score 3.683 and the mean score of the *green product/process design (GPD)* was 3.485, which both at the second and third place respectively. While, *training (T)*, *total involvement of employees (TEE)* and *supplier management (SM)* results to the lowest mean value with 3.322, 3.218, and 3.213.

**Table 8:** Ranking of GSCM Practices

Question	Mean	Level	Rank
• Top Management Commitment (TMC)	3.87	High	1
• Total Involvement of Employees (TEE)	3.218	Moderate	5
• Information Management (IM)	3.683	High	2
• Training (T)	3.322	Moderate	4
• Supplier Management (SM)	3.213	Moderate	6
• Green Product/Process Design (GPD)	3.485	Moderate	3

Based on the results, it can be concluded that top management commitment is the most critical success factor for GSCM implementation in case study company as the mean score is above 3.68 and have high impact on GSCM implementation. Top management commitment (mean = 3.87) was the most critical success factor for GSCM implementation in case study company. Followed by total involvement of employee (mean = 3.683), green product/process design (mean = 3.4848), training (mean = 3.3223), information management (mean = 3.218) and supplier management (mean = 3.213).

Table 9 shows ranking of four barriers in implementing GSCM. The results illustrate that the financial barriers get the first ranking with the mean score 3.87. Followed by the informational barriers with mean score 3.2964 and the mean score of the technology barriers was 3.485, which both at the second and third place respectively. While, organizational barriers results to the lowest mean value with 2.5493.



**Table 9** : Ranking of GSCM Barriers

Question	Mean	Level	Ranking
Organizational Barriers	2.5493	Moderate	4
Technology Barriers	3.1614	Moderate	3
Financial Barriers	3.8244	High	1
Informational Barriers	3.2964	Moderate	2

Based on the result, it can be concluded that financial barrier are major barriers for GSCM implementation in case study company as the mean score is above 3.68 and have high impact on GSCM implementation. The main barriers that lead to this financial barriers is high cost to purchase environmental friendly materials. In this situation, organization must take an action since financial resources are the fundamental to support the infrastructure of the overall green practice.

## Discussion

This section discusses and summarizes the overall finding of this study. The discussion will be made based on the research objectives. The research objectives are:

1. To identify the critical success factor in implementing GSCM in case study company
2. To identify the barriers in implementing GSCM in case study company.

### Critical Success Factors in implementation of GSCM

Based on results from data analysis, this study found that top management commitment is critical for GSCM implementation in Hicom Automotive Manufacturers (Malaysia) Sdn. Bhd. This finding is consistent with Hu & Hsu (2010) where successful implementation of GSCM depends on involvement of top management commitment. Besides, Andre *et al.* (2017) mentioned top management commitment is critical for every organization because their involvement can boost the decision making and also facilitate GSCM journey by establishing green policy, green management structure, and organize daily activities. It can be conclude that organization must have support from top management to make GSCM implementation success.

### Barriers in Implementation of GSCM

The second objective of this study aimed to identify barriers related to the adoption of green supply chain management in case study company. The findings of this study show that financial barriers have significant relationship with the adoption of GSCM. The finding is supported by Govindan *et al.*, where financial resources are the fundamental in allowing the adoption of many environment practices. Many other authors such Ravi & Shankar (2005) has also supported that financial is essential to support the manpower and also infrastructure of overall green practices. Govindan *et al.*, (2014) and Deepak *et al.*, (2014) further explains that these elements such as lack of finances, non- availability of bank loans, high cost of hazardous waste disposal and high investments in green practices will impede the implementation of GSCM. Hervani *et al* (2005) also explained that the top management must provide financial strategic support in order to overcome the internal organizational limits and pressures to adopt GSCM in the organization.

## Conclusion

In conclusion, the objectives of this study have been achieved. Environmental issues have been a top topic that almost most studies includes some environmental responsibility. It became extremely important to show some concern to the environment and to the world we are living in. Integrating sustainability in the business world is especially vital because it is key for saving our lives and the lives of the people. Going green is a very hot topic nowadays and many people are getting concerned about the deteriorating environment. Environmental changes is a big problem that has its own solutions within each one of us. Adopting green practices into the supply chain

systems is a business necessity to save the environment. Green supply chain management is considered challenge for organizations to implement. There are many factors that are cause some obstacles to this implementation. Yet, there are more factors that are acting as drives for implementing green supply chain. Proper understanding of the issue is a crucial step that is highly needed to go into world of sustainability. Accurate research and effort should be accompanied when taking the decision of implementing green supply chain activities. This study is an attempt to reveal the CSFs and barriers that are faced when adopting a green supply chain practices. The results highlight the major CSFs and barriers that face by case study compayn when making sustainable and ecological development an actuality.

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