

Green Supply Chain Initiatives: Investigation on the Barriers in the Context of SMEs in Malaysia

Goh Chee Wooi and Suhaiza Zailani
Graduate School of Business, University Sains Malaysia, 11800, Penang, Malaysia

Abstract: With the increasing awareness of the consumers about environmental issues, businesses, households and governments increasingly want to buy green products. Therefore, firms need to implement strategies to reduce environmental impacts of their products and services. Small firms have difficulty to drive its supplier or suppliers' supplier to involve in the green initiatives. That showed that small firms are facing various difficulties and barriers to adopt green supply chain initiatives. Therefore, this study will find out the barriers that impede SMEs in Malaysia to adopt green supply chain initiative.

Key words: Supply chain initiatives, barriers, SMEs, strategies, Malaysia

INTRODUCTION

With the increasing awareness of the consumers about environmental issues, businesses, households and governments increasingly want to buy green products. Therefore, firms need to implement strategies to reduce environmental impacts of their products and services (Lewis and Gretsakis, 2001; Sarkis, 1995; Sarkis and Cordeiro, 2001). According to Hansmann and Claudia (2001), success in addressing environmental items may provide new opportunity for competition and new ways to add value to core business programs. Therefore, market leaders in various industries have taken a step ahead to green their internal operation through ISO14000 certification. According to Handfield *et al.* (2005), the ISO 14000 principle provides framework, which guiding firms to implement EMS to improve environment performance only within the firm's operation boundaries instead of through the supply chain. Therefore, by getting its own internal operation to be certified ISO14000 is only the first step but it does not ensure the whole supply chain is participating in green supply chain initiative. That shows that there are still a big gap between ISO14000 and green supply chain initiative. Who should take the responsibility and initiative to ensure the whole industry is practicing green initiative to reduce environmental impact? Is that the market leader, government or consumers' responsibility? Hence, this study will look into the barriers that affecting SMEs to participate in green supply chain initiative in the local context.

As the global climate has changed rapidly due to global warming, manufacturing and production process are viewed as the culprits in harming the environment, in

the form of waste generation, ecosystem disruption and depletion of natural resources (Fiksel, 1996). It is necessary for the industry to react and transform the way production systems operate towards sustainability. It can be achieved by extending the structure of the current one way supply chain to a closed loop, including supply chain operation designed for end of life products and packaging recovery, collection and reused in the form of recycling and remanufacturing (Beamon, 1999). Companies do not often change their businesses processes and it is this attitude allows inefficient processes to continue unabated causing unnecessary waste and pollution. For example, ineffective processes in the US automotive industry allowed the innovative Japanese automakers to become market leaders. Businesses that want to transition to a green supply chain should take the opportunity to review all their business processes to identify areas, where adopting a greener outlook can actually improve their business. Firms should review each process along the supply chain to identify if a more environmentally sound approach will help cure the inefficiencies that occur. Many companies in developed countries that have been through this exercise have identified processes, where raw materials were wasted, resources underutilized and unnecessary energy used due to inefficient equipment.

But there are still a lot of companies in Malaysia still behind and yet to adopt the green supply chain concept in their business strategy. According to Eltayeb and Zailani (2009), Malaysian fully owned firms have the lowest level participation of green supply chain initiatives compare to foreign based companies. One of the reasons that Malaysian owned firm having lowest participation of

green supply chain is the green purchasing is still a very new concept in Malaysia. Other than that, Lee (2008) found that firm size is also an influence factor for firm to practice green supply chain, bigger size firm tend to be more willing to participate in green supply chain initiative. According to Lee (2008), SMEs usually lack of the information resources or expertise to deal with environmental issue. Therefore, SMEs can be a source of environmental risk and bottleneck in pursuing the goal of greener supply chain.

With increased pressures for environmental sustainability, it is expected that firms will need to implement strategies to reduce the environmental impacts of their products and services (Lewis and Gretsakis, 2001; Sarkis, 1995; Sarkis and Cordeiro, 2001). Otherwise, firms will lose its competitiveness in the market. Environmental impacts occur at all stages of a product production processes and supply chain. Therefore, in order to reduce environmental impacts of a product, firms have to ensure its own production process and supply chain practicing green initiative. According to Rao and Holt (2005), greening supply chain not only allow firms to achieve substantial cost saving, it would also enhance sales, market share, exploit new market opportunities, which lead to greater profit margins. All these benefits lead contribute to economic performance of the firm. On the other hand, the main focus for firm is to be profitable and sustainable in the competitive market. Under the pressure of global economy crisis, firms are struggling to fight for survival.

Therefore, cost reduction program has become a key agenda especially for SMEs instead of green initiative. According to Rao and Holt (2005), greening supply chain not only allow firms to achieve substantial cost saving, it would also enhance sales, market share, exploit new market opportunities, which lead to greater profit margins. By adopting green supply chain initiative would allow firms to enjoy all these benefits lead contribute to economic performance of the firm. But there are still a lot

of firms in Malaysia still have low involvement in the green initiatives. According to Eltayeb and Zailani (2009), local firms in Malaysia have very low involvement in green initiatives compare to MNC (Multinational Company). According to Wycherley (1999), small firms have difficulty to drive its supplier or suppliers' supplier to involve in the green initiatives. That showed that small firms are facing various difficulties and barriers to adopt green supply chain initiatives. Therefore, this study will find out the barriers that impede SMEs in Malaysia to adopt green supply chain initiative. Base on the statistics from Malaysia's Productivity report 2008, SMEs contribute 30.8% RM100,299 million or 30.9% of total manufacturing output in year 2008. Therefore, the success of SMEs is critical to economic growth of Malaysia in the future. With the increasing trend of global environmental protection awareness, SMEs in Malaysia will be out of the competition if green initiatives still not adopted as part of their business strategy. Therefore, this study will focus on the barriers which impede firms in SMEs context in Malaysia to adopt green supply chain initiative.

SMEs in Malaysia: SMEs in Malaysia have been defined according to size, turnover and activity. Definitions of SMEs in Malaysia fall into 2 broad categories:

- Manufacturing, manufacturing-related services and agro-based industries
 - Full-time employees not exceeding 150
 - Annual sales turnover not exceeding RM25 million
- Services, primary agriculture, information and communications technology
 - Full-time employees not exceeding 50
 - Annual sales turnover not exceeding RM5 million

An enterprise is considered to be an SME based on annual sales turnover or number of full-time employees as indicated in Table 1 and 2.

Table 1: SME definition base on number of full time employees

Size	Sector		
	Primary agriculture	Manufacturing (including Agro-based) and MRS	Services Sector (including ICT)
Micro	<5 employees	<5 employees	<5 employees
Small	Between 5 and 19 employees	Between 5 and 50 employees	Between 5 and 19 employees
Medium	Between 20 and 50 employees	Between 51 and 150 employees	Between 20 and 50 employees

Table 2: SME definition based on annual sales turnover

Size	Sector		
	Primary Agriculture	Manufacturing (including Agro-Based) and MRS	Services Sector (including ICT)
Micro	<RM200,000	<RM250,000	<RM200,000
Small	Between RM200,000 and <RM1 million	Between RM250,000 and <RM1 million	Between RM200,000 and <RM1 million
Medium	Between RM1 million and RM5 million	Between RM10 million and RM25 million	Between RM1 million and RM5 million

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According to the Malaysia's Annual Productivity Report 2008, SMI (Small and Medium Industries) constitute 99.2% of total business establishment in Malaysia. Therefore, Malaysian government acknowledged the importance to develop the capabilities of SMEs sectors in order to broaden the sources of economic growth. The development of SMEs was reflected in the Ninth Malaysia Plan (9MP: 2006-2010) and the Industrial Master Plan (IMP3: 2006-2020). In 2008, SMEs produced RM100,299 million or 30.9% of total manufacturing output. Most of the SMEs were involved in food and beverages (32.2%), chemicals and chemical products (17.2%), rubber and plastic products (10.1%), fabricated metal products (6.4%) and basic metals products (6.1%). In Table 3, there is the breakdown of SME by business sector. Manufacturing sector is biggest sector among the SMEs in Malaysia.

Green supply chain: The traditional supply chain is defined as an integrated manufacturing process wherein raw materials are manufactured into final products, then delivered to customers via distribution, retail, or both (Beamon, 1999). Green Supply Chain Management's definition has ranged from green purchasing to integrated supply chains flowing from supplier, to manufacturer, to customer and reverse logistics, which is closing the loop as defined by supply chain management literature (Zhu and Sarkis, 2004). Comparing the definitions of SCM and GSCM, it is clearly shown that green supply chain involved not only integrating the manufacturing processes and distribution to customers. It also covers from the very beginning stage when the product is designed until the product is disposed. That shows that it requires a full integration and collaboration of the players along the product life cycle.

In order to achieve the green supply chain, manufacturing organizations must follow the basic principles established by ISO 14000 (Beamon, 1999). The ISO 14000 principle provides framework, which guiding firms to implement EMS to improve environment performance only within the firm's operation boundaries instead of through the supply chain (Bansal and Clelland, 2004; Handfield *et al.*, 2005). Eltayeb and Zailani (2009) reviewed twenty one literatures on green supply chain initiatives and concluded that the green supply chain initiatives can be generally classified into three major elements:

- Eco-design or design for environment
- Green purchasing
- Reverse logistics

Table 3: Breakdown of SME by business sector

Business sector	No. of companies	Percentage
Manufacturing (incl. Agro based)	5932	36.3
Manufacturing related service	1398	8.6
Mining and quarrying	36	0.2
Services (including ICT)	5227	32.0
Construction	1581	9.7
Primary agriculture	317	1.9
Others	1858	11.4

<https://secure.smeinfo.com.my/directory/index.php> (September 2009)

These three elements were selected as independent variables to measure the level of adoption among ISO 14001 certified manufacturing firms in Malaysia. Firms are require to incorporate these three elements into their corporate culture and formulate a strategy and practices in order to allow firm to be the driver and initiator in green supply chain. On the other hand, Eltayeb and Zailani (2009) found that green purchasing and reverse logistic have lower adoption compare to eco-design. That showed that green supply chain initiatives that involve external relationship with suppliers and customers have lower adoption compare to internal focus. This indicated that firms in Malaysia are facing internal and external barriers to adopt the three elements of green supply chain initiative. Hence, to incorporate these three elements into SMEs corporate culture and business strategy is not an easy task.

Design for environment: Design For Environment (DFE) is a concept which reduces the impact to environment of products or services across its life cycle. Design for environment gives guideline for the design engineer to examine the environmental soundness of a product over its entire life cycle (De-Mendonca and Baxter, 2001). The impact of product life cycle is evaluated against other alternative for reducing waste and energy, recycling or elimination of product waste during manufacturing. De-Mendonca and Baxter (2001) made a comparison of the objectives between DFE and ISO 14000. They conclude that DFE is more comprehensive than ISO 14000. That also aligns with the finding from Bansal and Clelland (2004) and Handfield *et al.* (2005) that ISO 14000 standard does not provide sufficient components to support green supply chain approach.

Green purchasing: Green purchasing means that purchasing or supply chain managers consider the issue of sustainability in their purchasing of inputs in addition to the traditional purchasing criteria of cost, quality and delivery (Lambert and Cooper, 2000). Hamner (2006) suggested seven basic elements for green purchasing element, which are product content requirements, product content restrictions, product content labeling or disclosure, supplier questionnaires, supplier EMSs,

supplier certification and supplier compliance audit. By having all these elements in the SMEs' firm require additional effort and resources. According to Lee (2008), buyer is the most important influential stakeholder to for the supplier to participate in green supply chain initiative. That showed that green purchasing is one of the key elements for firms to participate in green supply chain initiative. However, Zsidisin and Hendrick (1998) concluded that purchasing managers are not the only driver to promote and influence the environmental supply chain involvement, it is top management's responsibility to prioritize the environmental concerns and cascade through the entire organization which involve procurement, logistics, warehousing practices, operations, marketing and governmental agencies. Therefore, the green purchasing initiative can be viewed in two perspectives which are internal and external. In term of internal perspective, top management is the key driver to drive its firm to take part in green supply chain initiative by putting priority to drive all levels in the organization. On the other hand, in external perspective, purchasing managers are the driver to drive its supplier along the supply chain to participate in green supply chain initiative.

Reverse logistic: Reverse logistic is defined as returning the end of life product or packaging from end user back to the supplier. The supplier can recycle, refill, remanufacture, refurbish, repair, repackaging or reclaim the material. A well managed reverse logistics program can result in savings in inventory carrying transportation and waste disposal costs as well as improving customer service (Rogers and Tibben-Lembke, 1999). According to Wu and Cheng (2006), reverse logistic programs can result in significant saving. Taking HP's laser jet toner cartridge recycling program as example, HP has recycling programs throughout the world and claims that since 1990, HP was able to divert over 18 million pounds of material from landfills by recycling every toner cartridge received by providing consumers with pre-paid UPS label to send the used toner cartridge back to HP. However, remanufacture the returned products is limited to certain product or models due to its design, technology and functionality because some returned product might be in poor condition where it cannot be remanufacture (Klausner and Hendrickson, 2000). Therefore, firms need to understand the cost structure and the feasibility of reverse logistic in its organization.

Barriers for SMEs to adopt green supply chain initiative: Simpson *et al.* (2004) concluded that most of the SMEs in UK were unaware of the environmental legislation and the requirements. That also correlate to the finding by Lee

(2008) that government playing an important role to boost the awareness and knowhow about environmental improvement. Therefore, government involvement and support through funding, taxation policy, import duty, business training to promote SMEs to make their move to involve in green supply chain initiative. According to Min and Galle (2001), adopting green supply chain initiative requires additional effort and also higher cost and it is less visible economic benefits from these initiatives.

Base on the study conducted by Simpson *et al.* (2004), most of the SMEs think that adopting good environmental practice unable to gain competitive advantage and improvements in their business and it was a financial cost added to the business which not possible to pass on to customers. Min and Galle (2001) also found that cost concern is the most serious obstacle for taking environmental factor into account in purchasing process. Therefore, SMEs had poor perception that there is a need for environmental improvement. Another barrier which highlighted by Wycherley (1999) in the case study of Body Shop International, existing investments, information system and habits are costly and difficult to change. That happened to Body Shop Internal whereby the volume of Body Shop International is too small to influence its suppliers suppliers. That show that even Body Shop International, which an international level corporation facing this problem. SMEs will face a tougher challenge to influence its suppliers due to the size of the business is not big enough to influence its suppliers or suppliers suppliers to change. Perron (2005) summarized that there are 4 barriers found to impede the adoption of green initiatives in SMEs, which are:

Attitudinal and perceptions barriers: Resistance to change is one of the common attitudes observed in top management, particularly among SMEs. Fear of the unknown and fear of failure are the primary reasons for such an attitude.

Information related barriers: SMEs are often lack of awareness and information, the management may not be aware of what is going wrong in the organization. They may not understand the environmental impacts of activities of the organization. Also, internal communication in the organization may be weak. Other than that, lack of exposure is another common problems faced by SMEs. Management does not have information on what initiatives have been taken by other organizations and how successful they have been. Benefits of a system based and business-environment integrated approach are often not known to the top management.

Technical barriers: State-of-the-art information on new technologies, materials, operations and industrial processes is often not available to the top management particularly in SMEs and technical support is not updated within the industry. Lack of technical expertise is also a major barrier.

Resources barriers: Resource barriers can be further breakdown into financial barriers and human resource barriers. The issues for financial barriers include lack of funding for environmental projects or ROI period is too long. Lacking of human resource in term of quantity and quality can be the barrier for SMEs to pursue environmental management.

Another finding from Van Hemel and Cramer (2002) that the barriers for SMEs to green their products is the SMEs do not perceive greening the environment is their responsibility that is actually align with the finding from Perron (2005) in term of attitudinal and perception barrier. Other than that, Van Hemel and Cramer (2002) also mentioned that there was no clear information regarding environmental benefit in greening their products. That shows that SMEs do not have a clear understanding and information regarding the benefits of green initiative. That also aligns with the finding from Perron (2005) in term of information related barrier. Van Hemel and Cramer (2002) also found that SMEs not able to find alternative solution in designing their products to fulfill the design for environment requirements. That is another form of technical barrier as described by Perron (2005). According to Walker *et al.* (2008), there are more external barriers than internal barriers. The external barrier that described by Walker *et al.* (2008) was regulation, poor supplier commitment and industry specific barriers, whereas the internal barriers are cost and lack of legitimacy. Base on the literatures, there are more internal barriers than external barriers which claimed by Walker *et al.* (2008).

Business strategic orientation: According to the study from Wang and Ahmed (2009) on the moderating effect of business strategic orientation on e-Commerce adoption from UK family run SMEs, family run business can be classified into three clusters:

Family oriented: The focus is on family side where decisions in relation to the family like keeping ownership within the family, generating income to dependent families and maintaining family reputation are the major concern.

Business oriented: The focus is on business side where strategic issues such as adoption of new technology, growth strategy of business and involvement of new investors may often appear on the board's agenda.

Balanced oriented: Do not express clear preference of either family or business oriented, but concerned to arrive at appropriate balance between family and business issue.

The research from Wang and Ahmed (2009) found that if the firm hold solid business first perspective, the firm may view the pressure from external environment more positively and incorporate the innovation. Therefore, the firm may be more focus on the enhancement of its competitiveness and protect its survival against the competition. Hence, the business oriented firm may be more likely to adopt green supply chain initiative. On the other hand, if the firm adhere to family first philosophy, the firm may be risk adverse and exceedingly cautious about changes that the whole family may rely on the financial income originated by the firm. Hence, the family oriented firm may be more reluctance to change and adopt green supply chain initiative.

Theoretical framework: This research attempt to identify the significant level of each internal barrier, which impede SMEs in Malaysia to adopt green supply chain initiative. Other than that, this study also investigates the moderating effect of business orientation of the firm towards the level of adoption of green supply chain initiative (Fig. 1).

Hypothesis development: Based on the problem statement, research questions, literature review and the theoretical framework, the hypothesis for the research are developed:

Attitudinal and perceptions barrier: According to Van Hemel and Cramer (2002) and Simpson *et al.* (2004), SMEs do not perceive greening the environment is their responsibility and unable to gain competitive advantage and improvement in their business. In reality, greening the environment is part of the responsibility of every individual. It would be a barrier for the entire supply chain

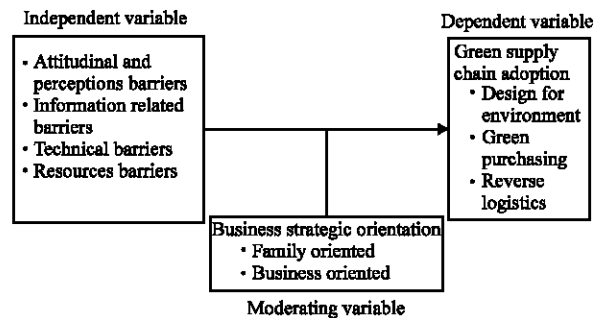


Fig. 1: Theoretical framework

to adopt green initiative if SMEs having such attitude and perception. Hence, the following hypothesis is proposed:

H1: The higher attitudinal and perceptions barrier the lower the adoption of green supply chain initiative.

Information related barrier: Van Hemel and Cramer (2002) and Simpson *et al.* (2004) mentioned that SMEs are unaware of the benefits of green supply chain initiative as well as the environmental legislation and the requirements. That indicates that SMEs would not be adopting green supply chain initiative if they do not have a full understanding and information regarding the benefits of green supply chain initiatives. Therefore, the hypothesis is suggested as:

H2: The higher the information barrier the lower the adoption of green supply chain initiative.

Technical barrier: Van Hemel and Cramer (2002) mentioned that SMEs not able to find alternative solution in designing their products to fulfill the design for environment requirements. That would be the barrier for SMEs to participate in design for environment for their process and product design. Hence, the hypothesis is developed as:

H3: The higher the technical barrier, the lower the adoption of green supply chain initiative in term of design for environment.

Resource barrier: Resources are always a limitation for most of the firms. According to Min and Galle (2001), cost concern is the most serious obstacle for taking environmental factor into account in purchasing process. Other than that, Wycherley (1999) also mentioned that it is too costly to change the existing investments, information system and habits. Other than financial barrier, human resource is also part of the resource barrier. Therefore, the hypothesis suggested is:

H4: The higher the resource barrier the lower the adoption of green supply chain initiative.

Business strategic orientation: According to Wang and Ahmed (2009), the firm which is family oriented is more risk adverse and may not be sensitive to the pressure from environment as a positive drive. Therefore, the hypothesis suggested are:

H5: The family business orientation has a moderating effect on the level of adoption of green supply chain initiative.

H5a: The higher the family oriented the lower the level of adoption of green supply chain initiative.

H5b: The higher the business oriented the higher the level of adoption of green supply chain initiative.

MATERIALS AND METHODS

Research design: Base on the theoretical framework, 5 hypotheses were developed and to be tested to evaluate the significant level of the barriers. This research is a quantitative research, which try to find out the key barrier that faced by SMEs in Malaysia in adopting green supply chain initiative. The moderating effect of business strategic orientation will also be evaluated to have better understanding of the relationship of the barriers.

Sampling method and population sample: The data collection of this study will be carried out by using email, hand distribution and mailing to the respondent. The target respondents are the owner, director, buyer or senior managers of the SMEs in Malaysia. Manufacturing sector consists of 5932 of companies in all over Malaysia thus, it is difficult to reach every manufacturing company and it is expected the response will be low. Therefore, this study is planned to select 10% out of 5932 manufacturing companies from various manufacturing activities which is about 600 questionnaires will be sent by mailing or e-mailing the questionnaire to the selected company to participate the survey.

Sample size: This research consists of total thirty seven questions, seventeen questions from dependent variable and twenty questions from independent variable. Base on the rule of thumb, five samples are required for each question. Hence, a minimum of 185 sampling data are needed.

Measurement of variables: This research intends to examine the significant level for each independent variable and the relationship of the independent variables and dependent variables as well as moderating variable. There are 4 independent variables, 1 moderating variable and 3 dependent variables. The independent and dependent variable of the study will be measured by using five points Likert scale

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Table 4: Measures of variables and operational definitions

Section	Variables	Operation definition
A	Personal information	Respondent personal information
B	Organisation information	Firm size, age of business, business type, type of industry, business strategic orientation
C	Green Supply Chain Adoption (design for environment)	The level of adoption in design for environment
D	Green Supply Chain Adoption (green purchasing)	The level of adoption in green purchasing
E	Green Supply Chain Adoption (reverse logistic)	The level of adoption in reverse logistic
F	Attitudinal and perception barrier	The attitude and perception towards environmental initiative and the level of resistance to change
G	Information related barrier	The level of available information regarding environmental improvements
H	Technical barrier	The availability of technical expertise to design products according to design for environment. The ability to guide supplier in green initiatives
I	Resource barrier	The level budget allocate for green initiatives. The level of manpower available

The moderating variable of the study will be measured by number of family members in the firm. Other than that, the questionnaire has a brief describing two companies (company A and B) with different strategic concerns. Respondent will be asked to distribute 100 points between two descriptions depending on how they perceived the statement in relation to their own business situation. The measurement of the variables is summarised in Table 4.

CONCLUSION

The hypothesis development done earlier will provide the guideline on what are the expected findings at the end of the research. It is expected that there is low adoption of green supply chain initiatives in SMEs in Malaysia. Other than that, the resources barrier will be the key barrier that impedes the adoption of green supply chain initiative. Technical barrier is expected to be the subsequent barrier for the manufacturing sectors. Base on the findings from literatures, the level of green supply chain initiatives would be moderated by the business strategic orientation. Therefore, it is expected that the firm which is family oriented would have lower adoption of the green supply chain initiative as compare to the firm which is business oriented.

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