

## **Pressures, Green Supply Chain Management Practices and Performance of ISO 14001 Certified Manufacturers in Malaysia**

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### **ABSTRACT**

As the language of environmentalism become more vocal globally — including in Malaysia — a growing number of organizations are intending to adopt green approaches throughout their entire supply chains. Issues of environmental protection are central and dynamic; as such, there is an ongoing need for studies to fully understand and update knowledge in this area. This paper investigates green supply chain management (GSCM) among 112 ISO14001 certified manufacturers in Malaysia. Specifically, the objectives of this study are to examine the influence of various pressures (regulation, marketing, competition, management, and cost) on the level of green practices, and the interrelationships between drivers, practices, and performance. The study also looks at the moderating effect of partner relationships. Results indicate that manufacturers in Malaysia experience high external pressures such as regulatory and marketing/customers pressures. The GSCM implementation, especially on external activities, are still at a moderate level except for internal environmental initiatives. GSCM practices affect firms' financial/market performance and customer satisfaction, but are not significant to environmental performances. The partner relationship (trust and commitment) moderate the relationship between GSCM practices and environmental performances but is not applicable to relationships between GSCM practices and other firms' performances such as

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market/financial outcomes and customer satisfaction. Subsequent implications for both theory and practice are discussed in the paper.

**Keywords:** Commitment, green, Malaysia, manufacturing, supply chain, trust

## INTRODUCTION

The manufacturing industry is not exempt from contributing to the deterioration of environmental sustainability. Nowadays, there is an increasing demand from customers for green products and services. Thus, many organizations have been urged by their stakeholders to adopt sustainable development and corporate environmental responsibility within their business activities. This has gradually and consistently extended far beyond merely complying with environmental regulations to proactive initiatives by a few global leading companies (Sarkis, 2003). Thus, organizations are continuously trying to come up with initiatives that can help them achieve environmental sustainability. Success in handling environmental management issues may provide new opportunities to increase competitiveness and new ways to add value to core business programs (Hansman and Claudia, 2001).

This paper highlights the issue of a green supply chain within the context of Malaysian manufacturers. Manufacturing is an important sector in Malaysia; it accounted for 24.5% of the nation's gross domestic product (GDP) and accounted for 16.78% of total employment in 2013, ranking as second-largest (Ministry of Finance, 2014). However, manufacturing also is responsible for almost half of all water pollution point sources. The negative impact of manufacturing activities on the environment has become a major concern of the Malaysian government. In line with this movement, the Ministry of Energy, Green Technology and Water was established on April 9, 2009 (Kettha, 2010).

Since the concept of a green supply chain is relatively new in Malaysia, this study's objectives are to investigate the green supply chain management drivers that trigger firms' participation in green initiatives. It also looks at the extent of GSCM practices within a firm, and attempts to determine whether adopting these environmental measures is worth the effort of the organizations in terms of environmental, market and financial performance, and customer satisfaction. In this research, we have considered how partner relationship (trust and commitment) moderate the relationships between GSCM practices and performance outcomes.

Understanding the GSCM scenario within manufacturing firms operating in Malaysia is crucial. Apart from sparse research in GSCM focusing on Malaysian samples, there are also three gaps in the body of knowledge in GSCM that could be addressed by this research. First, most studies in GSCM-related areas focus on

developed countries (Holt and Ghobadian, 2009; Hasan, 2013; Soosay et al., 2012; Simpson et al., 2007; Walker and Jones, 2012; Sarkis et al., 2010; Lee, 2008). Firms in developing countries like Malaysia are still in the learning process on how to incorporate green supply chain management practices in their daily operations (Rao 2002). Strong pressures from the public, customers, regulations and environmental standards have forced firms to be more concerned about the effect of their businesses on the environment. However, this issue has been insufficiently explored, especially in the Malaysian context (Eltayeb, Zailani and Filho 2010a).

Second, drivers in Malaysia may differ from those in Western countries due to the differences in organizational cultures, legislation and economic conditions. Through the identification of the related drivers for the Malaysian industry, it is hoped that an understanding can be achieved in determining the related drivers for manufacturers in the local context. Finally, previous researchers in this area report mixed results regarding the performance outcomes of green initiatives by the firms. Zhu et al. (2007) reported that firms that adopt green purchasing and eco-design practices will achieve better environmental performance compared to firms that implement other green initiatives, but that eco-design practices lead to a decrease in organizational performance. Eltayeb et al. (2010b) found that reverse logistics were significant only in terms of cost reduction, while green purchasing was not found to have a significant effect on any of the outcomes measured. As green issues are new, dynamic, and still evolving, ongoing research is needed to fully understand and update knowledge in this area.

In this study, we test the influence of trust between buyer and supplier as the moderator between GSC practices and performance. Trust has been proven in various previous studies as a vehicle to reduce the monitoring cost in operations.

## **RESEARCH FRAMEWORK AND HYPOTHESES DEVELOPMENT**

Institutional theory can be used to explain how regulations, consumers and competitive drivers could promote green practice adoption in organizations. According to this theory, an organization must conform to external pressures (DiMaggio and Powell, 1983) because institutional isomorphism will earn the organization legitimacy. GSCM drivers such as consumers, competitors and regulators would act as the coercive, normative and mimetic pressures which would encourage GSCM practices. Coercive isomorphic drivers occur from the influences of external pressures that have power (Jennings and Zandbergen, 1995). Government agencies, through their rules and regulations, are examples of coercive pressure for the enterprises. In contrast, normative isomorphic pressure refers to

drivers that cause companies to be perceived as having legitimate activities. For example, large and established companies are affected by normative pressure since they are more visible compared to small companies. Finally, mimetic isomorphic pressure occurs when companies try to emulate their competitors' practices that have proven successful in certain activities (Aers, Cormier and Magnan, 2006).

Previous studies have found that certain drivers such as regulations, marketing and internal drivers lead to higher urgency in green practices adoption (Holt and Ghobadian, 2009; Zhu and Sarkis, 2010; Christmann and Taylor, 2001). Different firms face different types of pressures and environmental challenges (Russo, 1997; Lyon, 2000). The findings of these previous studies show that GSCM drivers are positively related to GSCM practices because firms will reactively implement GSCM practices when they received pressures from external (regulatory bodies, existing customers) and internal (top management) pressures. In this study, through various compilations from previous research, we identified regulation, marketing, competitors, management commitment, and cost-related factors as the relevant drivers for GSCM practices. Therefore, in the context of Malaysian ISO 14001 certified manufacturers, the first hypothesis proposed is:

*H1 : GSCM drivers are positively related to GSCM practices.*

## **GSCM Practices and Environmental Performance**

Prior research on GSCM extensively considered the effects of green practices on performance outcomes. Relationships between GSCM practices and performance, both environmentally and economically, showed that there are strong relationships between the variables (Sarkis, 2003). According to Frosch (1999), an inter-firm linkage facilitated by proximity could lead to improvements in environmental performance. Within the organizations, green practices can reduce the number of hazardous and wasteful productions that may affect the employees' work conditions. In short, environmental outcomes represent the positive effects of green practices by the firms (Eltayeb et al., 2010). The benefits to the environment include reduction of emissions, decrease of hazardous and harmful materials and reduction of waste in the operations. It is expected that GSCM practices are positively related to the firm's environmental performances because practices like green purchasing will help minimize the usage of hazardous materials; meanwhile, internal green practices such as energy efficiency measures will reduce energy consumption. Thus, in the context of Malaysian ISO 14001 certified manufacturers it is hypothesised:

*H2a: GSCM practices are positively related to the firm's environmental performances.*

### **GSCM Practices and Firm's Performance (Market & Financial Performances and Customer Satisfaction)**

Firm's performance represents a direct impact of green practices on basic outcome measurements of firms. It includes the market and financial aspects together with customer satisfaction. Jaffe, Petterson, Portney and Stavins (1995) found that firms that comply with environmental regulations and adopt environmental practices need to bear additional costs; this lead to reductions in their capacity to compete. When firms try to enhance environmental performance, they draw resources away from their core activity, resulting in a decreased in profits (Hull and Rothenberg, 2008).

The most cited outcome in green supply chain practices is cost reductions (Eltayeb et al., 2010b) and improvement in financial performance (Mollenkopf and Closs, 2005). This can be achieved through savings resulting from more complete processing, better utilization of re-used products, and elimination of cost during waste-handling activities, lower energy consumption, lower packaging cost, lower production cost and conversion of waste into valuable forms (Porter and van der Linde, 1995; Mollenkopf and Closs, 2005). Hence, green practices are expected to improve product image and enhance the reputation of a firm in the eyes of the customers through the reduction of rejected orders and thus increased customer satisfaction. Thus, in the context of Malaysian ISO 14001 certified manufacturers, it is hypothesised that:-

*H2b: GSCM practices are positively related to a firm's market/ financial performance.*

*H2c: GSCM practices are positively related to a firm's customer satisfaction.*

### **Trust and Commitment as Moderators on the Relationship Between GSCM Practices and GSCM Performances**

A committed partner will always be willing to sacrifice short-term benefits for long-term success (Mentzer, Min and Zacharia, 2000). Since the green process in goods production or services offered requires close monitoring to ensure compliance with all the standards, elements of trust and commitment between chain members can make it easier. With a good relationship between partners in a supply chain, the relationship between green practices and environmental performance can be improved (Mezher and Ajam, 2006). In this study, partner relationships refer to trust and commitment between firms and their partners. With the trust element in the collaboration process, information or knowledge exchanged between partners

will be more accurate (Currell and Judge, 1995). Trust between partners encourages openness to more flexibility in managing production capacity, and better response to the changes of product mix. Meanwhile, committed suppliers will ensure that products are delivered at the right time and place and in the right quantities ordered by the customers. Trusting relationships reduce transaction cost, which lead to lower production cost and an increase in the profit margin. In addition, good partner relationships between supply chain members may help the performance implications of the GSCM practices. Thus, we hypothesise:

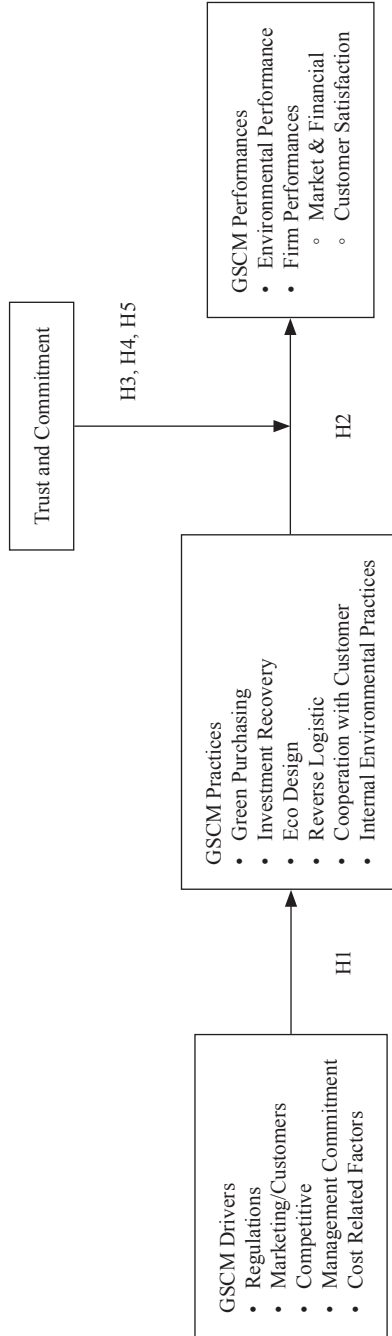
*H3 : Trust and commitment moderate the relationship between GSCM practices and environmental performance.*

*H4 : Trust and commitment moderate the relationship between GSCM practices, market and financial performance.*

*H5 : Trust and commitment moderate the relationship between GSCM practices and customer satisfaction.*

The conceptual framework of this research is depicted in Figure 1.

The population for this study came from the listing of all EMS ISO 14001 certified manufacturing firms registered as members of the Federation of Malaysian Manufacturers (FMM). The FMM is a private-sector organization representing the interests of 2,500 industrial establishments in Malaysia. FMM is the officially recognized and acknowledged voice of the manufacturing industry. The ISO 14001-certified companies were selected because they were expected to adopt green initiatives within their operations as part of the certification requirements (Eltayeb et al., 2010; Sroufe 2003; Zhu et al., 2007). Since the number of FMM members that were certified with ISO 14001 was only 378, this study used the census method to collect data from the entire population. Within the ISO 1400001-certified firms, Environmental Management Representatives (EMR) were appointed whose responsibilities include updating all documents and SIRIM regarding green issues. The survey was addressed to the EMR in each firm and data were collected through email as well as direct visits. At the end of a three-month data collection period, a total of 112 responses were usable for further analysis.



**Figure 1** Conceptual framework

## Measures

The questionnaire consisted of five sections, including demographic information. Section A contained questions to measure the GSCM of organizations, based on the work of Zhu et al., (2005) and Holt and Ghobadian (2009). Twenty-two items were asked to indicate which factors most influenced firms to be involved in GSCM activities, using a scale from 1 = not at all important to 5 = extremely important. The reliability for this scale measured with Cronbach's Alpha was 0.929. Section B asked respondents about the level of GSCM practices within their organizations, based on studies by Zhu et al. (2005), Holt and Ghobadian (2009) and Rogers and Tibben-Lembke (2001). The scale ranged from 1 = not considering it to 5 = implementing it successfully. The reliability for this scale measured with Cronbach's Alpha was 0.897.

Section C contained questions to measure the environmental performance of the company. Environmental performance includes the actual impact of green supply chain practices on the environment, such as compliance with environmental standards, reductions in air emissions and waste, number of environmental accidents, and consumption of hazardous materials. This section included six questions adapted from Zhu et al. (2005). The scale provided ranged from 1 = not at all to 5 = significant. The reliability for this scale measured with Cronbach's Alpha was 0.904. Meanwhile, the second category measured organizational performance by looking at the financial and market aspects plus customer satisfaction. These 15 items were adapted from Kim (2006) with reliability value of 0.87, and a seven-point Likert scale ranging from 1 = worst in industry to 7 = best in industry. The reliability for this scale measured with Cronbach's Alpha was 0.853.

Section D included questions to evaluate customer satisfaction. These were based on the reduction of response time for any changes, the reduction of response time for product return or after services, the accuracy of order processing and the speed of order handling (Kim, 2006). The scale ranged from 1 = greatly decreased to 7 = greatly increased. The reliability for this scale measured with Cronbach's Alpha was 0.817. Ten questions asked about the partner relationship (trust and commitment) between their firms and suppliers/customers. The answer was based on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The reliability for this scale measured with Cronbach's Alpha was 0.729.

## RESULTS AND ANALYSIS

The characteristics of responding firms are presented in Table 1. The table shows that the highest number of responses was received from electrical and electronics manufacturers; they constituted 25% of the total respondents. This was expected,



because the electrical and electronics industry is the largest industry in Malaysia. More than half (58.9%) of the respondents have been in operation for more than 20 years. Half of the firms were considered large (i.e., with sales turnover of more than 7.8 million USD) and most of the firms (76.8%) have more than 100 employees.

**Table 1** Profile of sample firms (N=112)

<b>Type of Product Manufactured</b>	<b>Total</b>	<b>Percentage</b>
Chemical and adhesive products	8	7.2
Iron, steels products	13	11.6
Plastic products and resins	11	9.8
Automotive and components parts	9	8
Industrial and engineering products	8	7.1
Pharmaceutical, medical equipment, cosmetics, toiletries and household	4	3.6
Packaging, labelling and printing	13	11.6
Rubber products	4	3.6
Electrical and electronics products	28	25
Toy manufacturers	3	2.7
Others	11	9.8
<b>Years of operation</b>		
Less than 20 years	46	41.1
More than 20 years	66	58.9
<b>Number of Employees</b>		
Less than 50	8	7.1
50 to 100	18	16.1
101 to 500	51	45.5
501 to 1000	19	17
More than 1000	16	14.3
<b>Annual Sales Turnover</b>		
Less than 78,100 USD	4	3.6
Between 78,100 USD to 3.1 million USD	15	13.4
Between 3.1 million USD to 7.8 million USD	34	30.4
More than 7.8 million USD	59	52.7

The objective of this research was to examine the drivers of green supply chain management that triggers firms' participation in green initiatives. Table 2 provides means and standard deviations of the five aspects of green supply chain management drivers under study: regulations, marketing/customers, competitors,

management commitment and cost-related factors. The most important factor is regulations (mean = 4.24), followed by cost-related factors (mean = 4.15). The lowest green supply chain driver was management commitment (mean = 3.93).

**Table 2** Descriptive statistics for GSCM drivers

Variable	Mean	Standard deviation	Min	Max
Regulations	4.24	0.61	1	5
Marketing/Customers	4.06	0.52	2	5
Competitors	3.96	0.68	1	5
Management Commitment	3.93	0.71	1	5
Cost Related Factor	4.15	0.56	2	5
Total Mean for GSCM Drivers	4.08	0.49		

As seen in Table 3, manufacturers in Malaysia have initiated or adopted some green supply chain management practices. Internal environmental practices were the top GSCM practices implemented, with a mean score of 4.37. Next was eco-design (mean = 3.85) and investment recovery (mean = 3.83). The least common GSCM practice implemented by manufacturing firms in Malaysia was reverse logistics (mean = 3.18).

**Table 3** GSCM practices adopted/ initiated by Malaysia organization

Variable	Mean	Standard deviation	Min	Max
Green Purchasing	3.60	0.97	1	5
Investment Recovery	3.83	0.83	1	5
Eco-design	3.85	0.97	2	5
Internal Environmental Practices	4.37	0.59	2	5
Reverse Logistic	3.18	1.01	2	5
Cooperation with Customer/Suppliers	3.35	0.96	1	5
Total Mean for GSCM Practices	3.86	0.64		

This study also examined three types of firm performance: environmental performance, market/financial performance and customer satisfaction. Environmental performance outcomes include reduction of air emissions, wastewater, and solid wastes; decrease of environmental accidents and reduction in energy used. Market and financial dimensions include market share growth, sales

growth, savings in energy costs, and savings in the costs of input materials. The customer satisfaction criterion was defined as the accuracy of order processing, the speed of order handling and the reduction of product return ratio. Both performances measurements used a seven-point Likert scale ranging from 1 (greatly decreased) to 7 (greatly increased). As seen in Table 4, the mean value of environmental performance is 3.47. The market and financial performance is slightly higher than that of customer satisfaction, with mean values of 4.45 and 4.35 respectively.

**Table 4** Descriptive statistics on environmental performances

Variable	Mean	Standard deviation	Min	Max
Environmental Performances	3.47	0.91	1	5
Market & Financial Performances	4.45	0.64	2	6
Customer Satisfaction	4.35	0.61	2	6

## Hypotheses Testing

Hierarchical multiple regression analysis was used to test H1. Stepwise procedure was implemented in this regression model. Through this procedure, only significant predictors will be calculated in the regression (Piaw, 2009). Furthermore, this procedure can eliminate the multicollinearity problem that exists because of high correlations between predictor variables. The model includes company size as a control variable in step 1 to account for the possibility that the size of a firm may affect the extent of green practices (Zhu et al., 2007). In step 2, the five factors of GSCM drivers were treated as independent variables. Their impact on the GSCM practices was examined in five regression models. The regression results are summarized in Table 5.

Firm size was entered at step 1, explaining 6% of the variance in the GSCM practices. After entry of the GSCM drivers at step 2, the total variance explained by the model as a whole was 20.3% ( $F = 13.86$ ;  $p < 0.001$ ). The four control measures of regulations, market/consumers, competitive pressure and management commitment explained an additional 14.3% of the variance in GSCM practices, after controlling for firm size ( $R$  squared change = 0.143,  $F$  change = 19.487,  $p < 0.001$ ). In the final model, only three control measures were statistically significant, with the customer/marketing recording a higher beta value ( $\beta = 0.333$ ,  $p < 0.05$ ), than competitive factor (0.281,  $p < 0.05$ ) and regulations factor (-0.246,  $p < 0.05$ ). Thus hypothesis 1 — that GSCM drivers are positively related to GSCM practices — is partially supported at the  $p < 0.05$  level.

**Table 5** Hierarchical regression results between each drivers and GSCM practices

Independent variables	Dependent variable (GSCM practices)	
	Step 1	Step 2
Firm Size	0.245**	0.201+
Regulations		-0.246*
Marketing/ Customer		0.333*
Competitive		0.281*
Management Commitment		-0.0229
Cost Related Factor		0.083
R <sup>2</sup>	0.06	0.203
Adjusted R <sup>2</sup>	0.052	0.197
F-value	7.045**	13.86***

\*p < 0.1; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

Hypothesis 2a, 2b, and 2c state that GSCM practices are positively related to GSCM performances (environment, market/financial and customer satisfaction). Hypothesis 2a states that GSCM practices are a predictor for environmental performance. In this analysis, firm size was entered at step 1, explaining 0.7% of the variance in the GSCM practices. After entry of the GSCM practices at step 2, the total variance explained by the model as a whole was 14.2% (F = 2.451, p < 0.05). The variance explained indicated the percentage of change in a dependent variable (environmental performance) that can be collectively predicted by the independent variables (GSCM practices) in a regression model. The six control measures explained an additional 13.5% of the variance in GSCM practices, after controlling for firm size (R squared change = 0.135, F change = 2.719, p < 0.01) (see Table 6). In the final model, there were no control measures that were statistically significant with environmental performance. Even though there was a relationship between GSCM practices and environmental performance, there was no unique predictor for the relationship. Thus hypothesis 2a was not supported at the p < 0.05 level.

Hypothesis 2b stated that GSCM practices are predictors for market and financial performance. Similar steps as those in the analysis for hypothesis 2a were conducted. Results of the analysis are indicated in Table 7. The six control measures explained an additional 15.1% of the variance in GSCM practices, after controlling for firm size (R squared change = 0.151, F change = 3.370, p < 0.01). Thus H2b, which posited that GSCM practices are predicted for market and financial performances, is supported.

**Table 6** Regression result between GSCM practices and environmental performance

Independent variables	Dependent variable (Environmental performance)	
	Step 1	Step 2
Firm Size	-0.083	-0.154
Green Purchasing		0.016
Cooperation with Customers		0.144
Investment Recovery		0.114
Eco-design		-0.007
Internal Environmental Practices		0.131
Reverse Logistics		0.122
R <sup>2</sup>	0.007	0.142
Adjusted R <sup>2</sup>	-0.002	0.084
F-value	0.772	2.719

p < 0.1; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

**Table 7** Regression result between GSCM practices and market & financial performance

Independent variables	Dependent variable (Market & financial performance)	
	Step 1	Step 2
Firm Size	0.266**	0.228**
Green Purchasing		0.239*
Cooperation with Customers		0.110
Investment Recovery		-0.189
Eco-design		-0.065
Internal Environmental Practices		0.246*
Reverse Logistics		0.103
R <sup>2</sup>	0.071	0.222
Adjusted R <sup>2</sup>	0.062	0.169
F-value	8.346***	4.235***

\*p < 0.1; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

Hypothesis 2c stated that GSCM practices are predictors for customer satisfaction. Similar steps as those in the analysis for hypothesis 2a were conducted. Results of the analysis (see Table 8) indicate that the six control measures explained an additional 15.1% of the variance in GSCM practices, after controlling for firm size (R squared change = 0.151, F change = 3.268,  $p < 0.01$ ). Thus H2c, which posited that GSCM practices predicted customer satisfaction, is supported at the  $p < 0.05$  level.

**Table 8** Regression result between GSCM practices and customer satisfaction

Independent variables	Dependent variable (Customer satisfaction)	
	Step 1	Step 2
Firm Size	0.222**	0.197*
Green Purchasing		0.191
Cooperation with Customers		0.265*
Investment Recovery		-0.212
Eco-design		-0.127
Internal Environmental Practices		0.240*
Reverse Logistics		-0.076
R <sup>2</sup>	0.049	0.20
Adjusted R <sup>2</sup>	0.041	0.146
F-value	5.726**	3.721***

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ ; \*\*\*\* $p < 0.001$

To examine the effect of trust and commitment on the relationship between green supply chain practices and performances, hierarchical multiple regression analysis was used. The analysis was conducted according to the four steps suggested by Zhu and Sarkis (2004). In step 1, the control variable, firm size, was entered into the regression. In step 2, the mean score for GSCM practices was entered into the regression. In step 3, the mean score for trust and commitment was entered in one block. In step 4, the interaction term of mean score for GSCM practices and the mean score for trust and commitment (GSCM practices x trust and commitment) were entered as a block.

### Effects of GSCM Practices with Trust and Commitment on Environmental Performance

Hypothesis 3 suggested that trust and commitment will moderate the relationship between GSCM practices and environmental performance among manufacturers in Malaysia. In step 1, there was no significant relationship between the control variable and criterion (environmental performance). But in step 2, when the predictor variable was entered, it produced significant effects on the criterion variable, and explained 13% of the variance in the criterion variables. GSCM practices had a positive association with environmental performances ( $\beta = 0.361$ ,  $p < 0.001$ ). Entering the moderator variable in step 3 (trust and commitment) did not result in any significant effect on the criterion variables. In step 4, the interaction term between GSCM practices and trust and commitment produced a significant effect on the environmental performance ( $\beta = 2.653$ ,  $p < 0.05$ ). The combination of these variables explained a total of 16% of the variance in the criterion variables. Thus, hypothesis 3 is supported by this data. This means that when trust and commitment increase, GSCM environmental practices are enhanced. Table 9 contains the result of the regression analysis.

**Table 9** Hierarchical regression with GSCM practices/trust and commitment interaction on environmental performance

Variable entered	Dependent variable (Performance)			
	Environmental			
	Step 1	Step 2	Step 3	Step 4
Firm Size	-0.083	-0.172	-0.172	-0.181
GSCM Practices		0.361***	0.361***	-1.594
Trust & Commitment			0.003	-1.208
GSCM Practices × Trust & Commitment				2.653*
F value	0.772	8.112***	5.358***	5.106***
R <sup>2</sup>	0.007	0.130	0.130	0.160
R <sup>2</sup> Change				0.030

\* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ ; \*\*\*\* $p < 0.001$

### The Moderating Influence of Trust and Commitment on GSCM Practices on Market and Financial Performance

Next, hypothesis 4 suggested that trust and commitment will moderate the relationship between GSCM practices and market/financial performance among manufacturers in Malaysia. The same steps as with the previous analysis were taken to test this hypothesis. Results, shown in Table 10, indicate that the interaction term in step 4 did not result in any significant effect on the market and financial performances of the firms. The combination of all the variables measured in the regression contributes to 23.6% variance in criterion variable (market and financial performance). The data thus does not support hypothesis 4.

**Table 10** Hierarchical regression with GSCM practices/trust and commitment interaction on market & financial performance

Variables entered	Dependent variable (Performance)			
	Market & financial performance			
	Step 1	Step 2	Step 3	Step 4
Firm Size	0.266**	0.192*	0.13	0.125
GSCM Practices		0.301***	0.21*	-0.867
Trust & Commitment			0.293**	-0.372
GSCM Practices × Trust & Commitment				1.461
F value	8.346**	10.043***	10.536***	8.251***
R <sup>2</sup>	0.071	0.156	0.226	0.236
R <sup>2</sup> change				0.010

\*p < 0.1; \*\*p < 0.05; \*\*\*p < 0.01; \*\*\*\*p < 0.001

### The Moderating Influence of Trust and Commitment on the Relationship between GSCM and Customer Satisfaction

Another dimension of firm performance that was measured in this study was customer satisfaction. Table 11 displays the results regarding the moderating effect of trust and commitment on the relationship between GSCM practices and customer satisfaction. The interaction term GSCM practices multiplied with trust and commitment, was entered, but did not produce any significant effect on the criterion variable. Total variables in the regression explain 10.4% of the explainable variation on customer satisfaction. Hypothesis 5 is therefore not supported by the data.



**Table 11** Hierarchical regression with GSCM practices/trust and commitment interaction on customer satisfaction

Variable entered	Dependent variable (Performance)			
	Customer satisfaction			
	Step 1	Step 2	Step 3	Step 4
Firm Size	0.222*	0.176+	0.142	0.141
GSCM Practices		0.189*	0.139	-0.075
Trust & Commitment			0.159	0.027
GSCM Practices × Trust & Commitment				0.29
F value	5.726*	4.926**	4.17**	3.111*
R <sup>2</sup>	0.049	0.083	0.104	0.104
Adjusted R <sup>2</sup>				0.000

+p < 0.1; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

## DISCUSSION AND FINDINGS

This study provided figures and evidence in examining the relationship between green supply chain drivers and supply chain practices. It was found that green purchasing was predicted by firm size and regulations. This is consistent with Eltayeb et al. (2010), who found the effect of regulations on green purchasing to be direct in nature, because firms want to guarantee a continuous supply of green inputs that enable them to produce the green products specified by the regulatory bodies within the local or international market. The analysis found that eco-design is predicted by the competitive factor and firm size. Eco-design is one of the dynamic capabilities of firms in doing business that is triggered by competition in the market, especially in terms of environmental new product development (Pujari, 2004). In order to keep up with or outpace competitors and thrive in the challenging marketplace, firms have to offer some unique differences, such as reverse logistics activity, to their customers. We found that commitment and related costs were not unique predictors for any GSCM practices among manufacturing firms in Malaysia. Although there were some efforts and highlights given within the internal factors, the most underscored reason for firms to adopt green practices came from the external environment, e.g. customers, suppliers and regulatory bodies. This supports the findings of Eltayeb et al. (2010), who also found that Malaysian firms consider external pressures as the main criteria in deciding whether or not to go green or not.

Regarding green supply chain practices, we found that only reverse logistics was a significant predictor of the variability of firms' environmental performances. By incorporating reverse logistics into the supply chain activity, firms can collect

materials or products from other supply chain members and remanufacture, recycle and repackage them. In such cases, firms can minimize the solid and liquid waste that may occur during the production process. This finding is consistent with Helms and Hervanni (2006), who found that reverse logistics activities in the carpet industry resulted in added value because it was less detrimental to the environment.

In terms of the effect of green supply chain practices on market and financial performances, this study found that only green purchasing and internal environmental practices predict the market and financial outcomes among manufacturers in Malaysia. Integrating green initiatives into purchasing activities can include listing desired environmentally-friendly materials to suppliers before purchasing. This action is crucial because firms not only want to emphasize safety, but it can serve as a stepping-stone for them to gain new market share by introducing new products with safety and health compliance. Meanwhile, internal environmental practices also help firms improve their market and financial performances. Through internal practices, expenses on utilities such as air conditioning and electricity are reduced. A firm's own waste disposal systems or facilities can also reduce budgeting for third-party services. Reducing the production of pollution at the source can help companies to save costs (Rao, 2006) through an end-of-pipe approach to an Environmental Management System (Handfield and Nichols, 1999).

The regression results found that customer satisfaction is predicted by green purchasing activities within manufacturers in Malaysia. This result contradicts the findings by Eltayeb et al. (2010) that there was no significant effect of green purchasing on intangible outcomes, including the customer perception. The accuracy and speed of the production process can be increased if firms focus fully on preparing the materials. This particular action can directly minimize the rejection of products by customers. Simultaneously, it satisfies customer demand and needs. In most cases, if the firms' environmental supply chain is questionable, customers will immediately cease to do business with the firms (Rao, 2006).

This study also found evidence that the trust and commitment element moderates the relationship between green practices and environmental performance. For instance, firms may provide a list of hazardous materials that are prohibited by customers, and details of procedures that need to be followed, to suppliers. In this context, firms can utilize their good relationships with suppliers, known as relationship capital (Sambasivan et al., 2011) in completing the tasks and producing the products. This finding supports that of Ramayah et al. (2008) who indicated that high supply chain commitment leads to supply chain flexibility and reliability.

However, this study failed to find evidence regarding the moderation effect of trust and commitment on both market and financial performance as well as on customer satisfaction. Although the surveyed firms have good relationship capital

(trust and commitment) with suppliers, it is difficult to determine its effect on market and financial outcomes — because the majority of the production process that leads to a firm's income is based on the activities of the firm itself. It was a firm's responsibility to make sure that at the end of the process, its operation will generate profit. Studies by Cullen et al. (2000) and Kwon and Suh (2006) found that trust and commitment enhance firms' performances in the supply chain context. However, this effect has yet to be evident in a green context. Along the same line of argument, the lack of trust and commitment does not necessarily mean a poorer or better customer satisfaction dimension.

## **CONCLUSIONS, LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH**

This research was carried out to examine the relationship between GSCM drivers and GSCM practices and in turn to measure the relationship between GSCM practices and GSCM performances. Based on the results, we conclude that manufacturers in Malaysia have experienced high external pressures, such as regulatory and marketing/customer pressures. At the same time, they are also influenced by management commitment and industry competition to adopt GSCM initiatives. However, their GSCM implementation, especially regarding external activities, are still at a moderate level — with the exception of internal environmental initiatives. GSCM practices affect firms' financial/market performances and customer satisfaction levels, but are not significant to environmental performances. Partner relationships (trust and commitment) moderate the relationship between GSCM practices and environmental performances, but are not applicable to relationships between GSCM practices and performances such as market/financial outcomes and customer satisfaction.

The findings from this study contribute to the body of knowledge regarding green supply chain management, as environmentally friendly operations and processes become more important in today's world. Specifically, this study contributes to a greater understanding of the dimensions of such critical issues as the factors that influence firms to think and act more green. The identification of these drivers is relatively important, since Malaysia's economy depends on product sales to foreign countries. The country needs to compete with other developing countries in international markets, especially considering the emerging prominence of China and India in the world's economy.

This study provides managers with information, based on empirical evidence, regarding how green activities in their operations could lead to better performance. Finally, findings from this study can provide an early assessment

from the perspectives of the manufacturers regarding the effectiveness of numerous government efforts to achieve a target of reducing carbon emissions by 40% by 2025.

We have identified two limitations of this research. First, a larger sample size may be helpful to determine the moderating effect of the relationship between green supply chain practices and firm performance. Second, since green practices require proper planning, implementation and evaluation, firms may only be able to fully utilize the benefits of their actions over an extended period. As such, future research can include developing countries in the same region, e.g. Thailand, the Philippines, Myanmar, Vietnam and Singapore, in an effort to gain a better and more comprehensive understanding of these particular issues. In addition, future research also can include non-certified ISO 14001 manufacturers in the sample of study. The comparison between these two groups is important, as both constitute the backbone of the nation's income. Finding out why non-certified firms are not interested in officially complying with quality standards, yet are still involved in green practices, will be an interesting research area.

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