



***DRIVERS, PRACTICES AND PERFORMANCES OF GREEN SUPPLY
CHAIN MANAGEMENT OF ISO 14001 CERTIFIED MANUFACTURERS IN
MALAYSIA***

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**DRIVERS, PRACTICES AND PERFORMANCES OF GREEN SUPPLY CHAIN
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MALAYSIA**

By

KHAIRUL ANUAR RUSLI



**Thesis Submitted to the Graduate School of Management, Universiti Putra
Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science**

July 2012

DEDICATION

I lovingly dedicate this thesis to my wife, who supported me each step of the way;

For my parents and family who have never failed to give me moral support;

For all my lecturers, friends and students who always inspired me.



ABSTRACT

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Sciences

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The emergence of attention towards the prospects of South East Asia becoming a new centre for manufacturing industry is expected to create more job and business opportunities in the future. Despite the rapid changes in world development, the effect and consequences of manufacturing activities in the supply chain process has been widely discussed. An increasing amount of research into the underlying dimensions of greening the supply chain (GSCM) is gaining momentum and offers a lot of discoveries to be explored especially in the context of developing countries since more focus have been given to the developed countries in previous research. Thus, this study bridge the gap by examines the GSCM drivers, practices and performances of ISO 14001 certified manufacturers in Malaysia.

This study posits several hypotheses to examine the relationship between green supply chain drivers, practices and performances. This study also hypothesises that trust and commitment moderates the relationship between green practices and GSCM performances. Data was collected through interview sessions with representative from four selected manufacturers and self-administered questionnaires that were sent to respondents in the target sample which was drawn from a list of ISO14001 manufacturers obtained from the Federation of Malaysia Manufacturers (FMM) 2010. A total of 112 usable responses were received and used for the data analysis. Pearson's correlation and multiple regression analysis were used for the hypotheses testing in this study. The qualitative data from the interviews were used to further support the findings.

It can be conclude that manufacturers in Malaysia received high pressures to adopt GSCM however, the implementation and the outcomes for the GSCM practices still at par. The results provided support for four hypotheses posited in the research framework. Significantly, the findings indicated that Green Supply Chain Management (GSCM) drivers were positively related to GSCM practices. Meanwhile the elements of trust and commitment moderate the relationships between GSCM practices and environmental performances. However, the findings failed to find significant evidence on the moderating effect of trust and commitment on GSCM practices, and the other two outcomes indicators which were market/financial performances and customer satisfaction. The overall findings thus seem to support the theoretical model of the research.

ABSTRAK

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

FAKTOR, AMALAN DAN PRESTASI PENGURUSAN RANTAIAN BEKALAN HIJAU DI KALANGAN PENGILANG BERSTATUS ISO 14001 DI MALAYSIA

Oleh

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Peningkatan perhatian terhadap prospek Asia Tenggara sebagai pusat industri perkilangan dijangka akan mewujudkan banyak peluang pekerjaan dan perniagaan di masa hadapan. Pembangunan yang pesat dunia hari ini turut membincangkan tentang kesan dan akibat daripada aktiviti perkilangan yang berlaku dalam proses rantai bekalan. Bilangan kajian mengenai dimensi pengurusan rantai bekalan yang hijau semakin bertambah dan menawarkan banyak ruang untuk diterokai terutamanya dalam konteks negara membangun kerana fokus kajian terdahulu adalah kepada senario di negara-negara membangun. Maka kajian ini adalah bertujuan untuk mengkaji faktor, amalan dan prestasi pengurusan rantai bekalan hijau dalam kalangan industri perkilangan Malaysia yang berstatus ISO 14001.

Kajian ini mengemukakan beberapa hipotesis untuk mengkaji hubungan antara faktor, amalan dan prestasi pengurusan rantai bekalan hijau. Kajian ini juga turut

mengemukakan hipotesis bahawa kepercayaan dan komitmen mempengaruhi hubungan antara amalan hijau dan prestasi syarikat.

Data dikumpul melalui sesi temubual dengan wakil daripada empat syarikat terpilih dan melalui borang soal selidik yang dihantar kepada responden sasaran yang dikenalpasti melalui senarai syarikat yang berdaftar dengan Pertubuhan Pengilang-Pengilang Malaysia dan mempunyai pensijilan ISO 14001. Sejumlah 112 soal selidik yang diterima dan digunakan bagi proses analisis data. Korelasi Pearson dan analisis regresi berganda digunakan bagi menguji hipotesis kajian ini. Maklumat kualitatif yang diperoleh melalui sesi temubual turut digunakan untuk menyokong dapatan kajian ini.

Dapat disimpulkan bahawa industri perkilangan di Malaysia menerima tekanan untuk mereka terlibat dengan pengurusan rantaian bekalan hijau. Walaupun begitu, amalan dan prestasi industri yang terlibat dengan aktiviti ini masih lagi sederhana. Keputusan kajian menyokong empat hipotesis yang dikemukakan dalam kerangka kajian. Hasil kajian mendapati faktor pengurusan rantaian bekalan hijau berkait secara positif dengan amalan. Elemen kepercayaan dan komitmen menguatkan lagi hubungan antara amalan dan prestasi persekitaran syarikat. Namun, hasil kajian mendapati kepercayaan dan komitmen tidak menguatkan hubungan antara amalan dan prestasi kewangan, pasaran dan kepuasan pelanggan. Hasil kajian secara keseluruhannya menyokong kerangka teori kajian ini.

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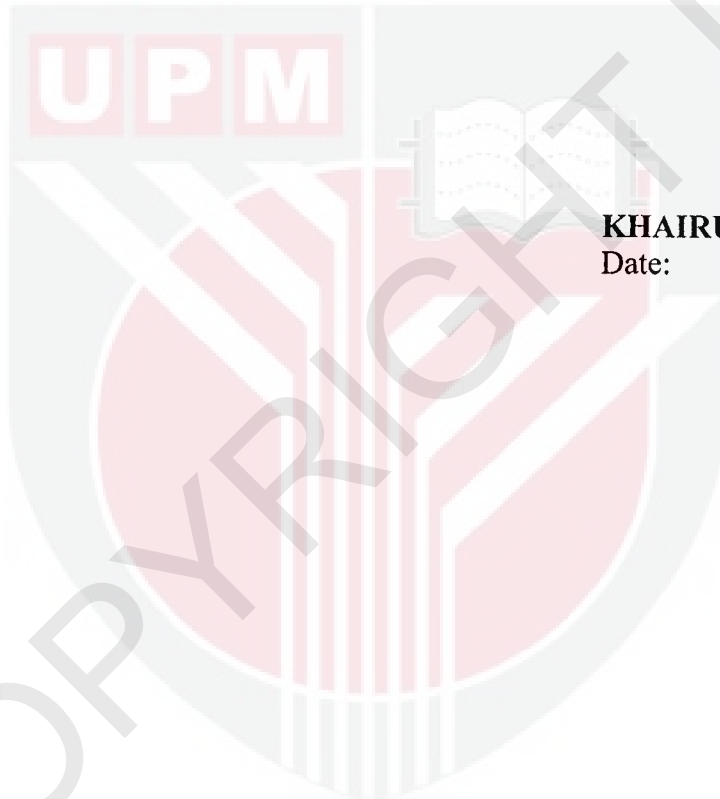
I would also like to thank Dr. Ho Jo Ann, my supervisory committee member, for encouragement, ideas and insightful comments at every stage of the way, which has helped to make this work a reality. Not forgetting my appreciation to Dr. Rashid Abdullah, the other member of my committee, for his support and knowledge in this topic. Without my supervisory committee's ideas and concern, I would certainly have encountered much more difficulty during the thesis writing process.

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Lastly, I want to thank my wife, parents and my family members for their support and encouragement in completing this thesis. My special thanks to all my lecturers, friends and staff at the Graduate School of Management, UPM who helped make this journey more interesting and meaningful.

DECLARATION

I declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not currently, submitted for any other degree at Universiti Putra Malaysia or any other institution.



KHAIRUL ANUAR RUSLI
Date:



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LIST OF ABBREVIATIONS

GSCM	Green Supply Chain Management
SCM	Supply Chain Management
FMM	Federation of Malaysian Manufacturers
MIDA	Malaysian Industrial Development Authority
MPC	Malaysian Productivity Corporation
MOF	Ministry of Finance
DOE	Department of Environment
CCM	Companies Commission of Malaysia
GDP	Gross Domestic Product
EMR	Environmental Management Representative
SPSS	Statistical package for Social Sciences
SIRIM	Standards and Industrial Research Institute of Malaysia
PM	Particulate Matters
SME	Small and Medium-sized Enterprise
MNC	Multinational Corporations
CSR	Corporate Social Responsibility

CHAPTER 1

INTRODUCTION

1.0 Introduction

Chapter 1 covers an overview of this study. It emphasizes the importance for organizations to implement green practices in supply chain management. This chapter consists of a background to the study, problem statement, research questions, research objectives, significance of the study, implications of the study, scope of the study, organization of the thesis and summary. In the background to the study section, the current situation of the green movement is discussed. It continues with a brief explanation of the manufacturing industry in Malaysia and the relationship between manufacturing industry and environmental issues based on Malaysian experiences. The factors that trigger this study are thoroughly discussed in the problem statement section. It then continues with the research questions and research objectives for the study. The importance of the study is revealed in the justifications section. Through the expected results from this study, the contributions for theoretical and managerial implications are summarized. This chapter ends with the organization of the thesis and summary.

1.1 Background to the Study

Rapid growth in the economy and physical development all around the world has contributed to environmental deterioration. At the same time, patterns of economic

consumption have also affected the sustainability of the environment. These circumstances have led to an increasing amount of hazardous waste. At present, the per capita generation of solid waste in Malaysia varies from 0.45 to 2 kg/day depending on the economic status of an area. The average per capita generation rate is about 1 kg/day, and even though 17,000 tonnes/day of solid waste is being generated; only 5% is currently being recycled (Green Manual, 2007). Hazardous waste, in the form of solids, liquids or gases, is also endangering the environment's sustainability. It is generated by nearly every industry, even though many industries claim to generate little hazardous waste on their part.

In response to the environmental issues and to generate prospects for a better future life, there have been efforts in both developing and developed countries to tackle these challenges such as the Kyoto Protocol 1997. Awareness of the importance of environment sustainability can be seen to be improved over time. In Malaysia, the government is serious about dealing with environmental issues within the country. Following the trends, and mindful of the need to manage green environmental issues, the Ministry of Energy, Green Technology and Water was established on April, 9 2009. Before that, it was known as The Ministry of Energy, Water and Communications (MEWC) which was established on March 27, 2004 replacing the former Ministry of Energy, Communications and Multimedia. This new function and responsibility showed that the government was serious about dealing with current global issues such as pollution, ozone depletion, global warming and any other matters related to environmental issues (Kettha, 2010).

After the establishment of this Ministry, more attention has been focused on green technology aspects in business. As one of the initiatives, the Ministry through its agency,

Malaysian Green Technology Corporation (GreenTech Malaysia) launched the National Green Technology Policy aimed at accelerating the national economy and promoting sustainable development (Kettha, 2010). GreenTech Malaysia also provides training and funding for businesses that are interested in supporting the development of green technology in Malaysia known as the Green Technology Financing Scheme. This scheme was introduced by the government in an effort to improve the supply and utilization of green technology. In the budget speech for 2010, Dato' Seri Najib Tun Abdul Razak, the Prime Minister of Malaysia announced the establishment of the Green Technology Financing Scheme amounting to RM1.5 billion. The scheme could benefit companies which are producers and users of green technology. Like it or not, the implementation of green technology is the one of the value added factors to help a company differentiate themselves from their competitors and lead to better market positioning through champions and also better satisfy their customers' needs. In addition, the purpose of the long term plan of Ministry of Energy, Green Technology and Water are to accelerate Malaysia to become a major producer for Green Technology and also to improve Malaysia's ranking in environmental ratings (Kettha, 2010). Thus, firms must take the opportunity to develop greener operations as it becomes a new agenda for the government.

Nowadays, there is an increasing demand from customers for green products and services. Thus, many organizations have urged sustainable development and corporate environmental responsibility within their business activity. This has gradually and consistently extended far beyond just complying with environmental regulations to proactive initiatives by a few world class companies (Sarkis, 2003). Thus, organizations

are continuously trying to come out with initiatives which can help them to 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). Approaches such as green purchasing, eco design, and cleaner production are examples of environmental management practices. Therefore, green supply chain management (GSCM) is considered to be a prerequisite for sustainable development.

Greening the supply chain has become an important factor that affects organizational performance. Nowadays, these fundamentals are recognized as a key strategic issue to enhance the competitiveness of organizations through improvements in their environmental performance. This initiative is an example of manufacturers' efforts to comply with mounting environmental regulations, to address the environmental concerns of their customers, and to mitigate the environmental impact of their production and service activities (Bacallan, 2000). Organizations can also decrease their environmental impact while raising their ecological efficiency at the same time (van Hock & Erasmus, 2000).

According to Wisner et al. (2005), customers are increasingly demanding to know where the products come from, how they are made and distributed, and what impacts future legislation will have on the products they buy. GSCM is a method to design and/or redesign the supply chain to incorporate recycling and remanufacturing into the production process. This involves the minimization of a firm's total environmental impact from the

start to the finish of a supply chain, and also from the beginning to the end of a product lifecycle (Beamon, 1999).

In response to the above discussed issues, green supply chain management continues to be an important research agenda in developed and developing countries alike. Therefore, this research will investigate the issue of a green supply chain within the context of Malaysian manufacturers. Since the concept of green supply chain is relatively new in Malaysia, this research will specifically look at drivers for the participation in the GSCM practices, the extent of GSCM practices within a firm, and determine whether adopting these environmental measures is worth the effort of the organizations in terms of environmental, market and financial performance together with the customer satisfaction dimension. This research will also investigate how an effective partner relationship (trust and commitment) moderate the relationships between GSCM practices and performance outcomes.

1.1.1 The Manufacturing Industry in Malaysia

The slowdown in the world's economy resulting from the financial crisis that began in the USA in 2007 continued to adversely affect the world's economy in 2009, particularly export-oriented economies, including Malaysia. Until the US financial crisis, Malaysia had enjoyed a decade of growth with economic expansion driven by the manufacturing and services sectors (MIDA, 2009). However, manufacturing remains an important sector in the Malaysian economy despite the fact that during the first nine months of 2009, value-added of the manufacturing sector declined by 13.7 % given the less favourable external economic environment. The sector accounted for 26.8 % of gross

domestic product (GDP) during this period. Exports of manufactured products decreased by 14.1 % from RM432.6 billion in 2008 (January-November) to RM371.5 billion in 2009 (January-November), accounting for 74.5 per cent of Malaysia's total exports for the period January-November 2009. Employment in the manufacturing sector was estimated at 3.3 million persons or 28.4 per cent of total employment in 2009 (Ministry of Finance, 2010).

Based on these figures and discussion, it is clear that manufacturing is one of the main contributors to Malaysian economic development. The importance of this sector will remain and continue to be a crucial area as Malaysia is one of the competitive countries in South East Asia and is an attractive foreign investment destination (MIDA, 2010). Despite the global slowdown, Malaysia continued to receive a significant amount of new investments. In 2009, investments in new projects amounted to RM22.1 billion (471 projects), constituting 67.8 per cent of the total investments approved. Of this, RM5.7 billion or 25.8 per cent was domestic investment while RM16.4 billion or 74.2 per cent was from foreign sources (MIDA, 2010).

The development and growth of manufacturing industry has been a major concern for the Malaysian government, seeking to maintain economic survival. Thus, endless efforts through the various ministries and agencies such as the Ministry of International Trade and Industry (MITI), Ministry of Human Resources, Malaysian Productivity Corporation (MPC) and Malaysian Industrial Development Authority (MIDA) have been made to promote Malaysia as the first choice for international corporations seeking to invest more in manufacturing industry. Besides that, the value of organizations such as the

Federation of Malaysian Manufacturer (FMM) as an industry representative in enhancing manufacturing activities is undeniable.

1.1.1.2 Manufacturing Industry and Environmental Issues: The Malaysia experience

In Malaysia, environmental issues have become a priority for the government and public communities (Eltayeb, Zailani and Ramayah 2010b). Both industry and individuals are the main causes of environmental deterioration. This is because individuals depend on industry's products to sustain their standard of life. However, many industries produce polluting emissions due to the products they manufacture to fulfil consumer needs and demands. Therefore, pollutant loads which happen throughout a product cycle are the main cause of environmental issues today (Abdullah, 1995).

Water pollution is one of the main environmental issues that are highlighted in Malaysia. In discussing water pollution sources, they can be categorized as point and non-point sources. Point sources include sewage treatment plants, manufacturing, agro based industries and animal farms. Meanwhile non-point sources are mainly diffused sources such as agricultural activities and surface runoffs. The Department of Environment (DOE) mainly maintains records of point sources. Since 2006 until 2009, there was an increasing number of water pollution point sources recorded which were caused by manufacturing industry. During 2008, the number decreased but continued to increase gradually in 2009.

The data recorded is as in Table 1.1:

Table 1.1: Number of water pollution point sources by manufacturing industry (2006 – 2010)

Year	2006	2007	2008	2009	2010
No of water pollution point sources	8534	8708	6830	9762	9069

Source: Department of Environment Annual Report 2006-2010

From the table above the highest pollution sources were recorded in 2009, and as can be seen in Figure 1.1, the highest contribution to water pollution in that particular year was recorded from the manufacturing industry. Compared to other economic activities, manufacturing industry contributed almost half of the water pollution emissions:

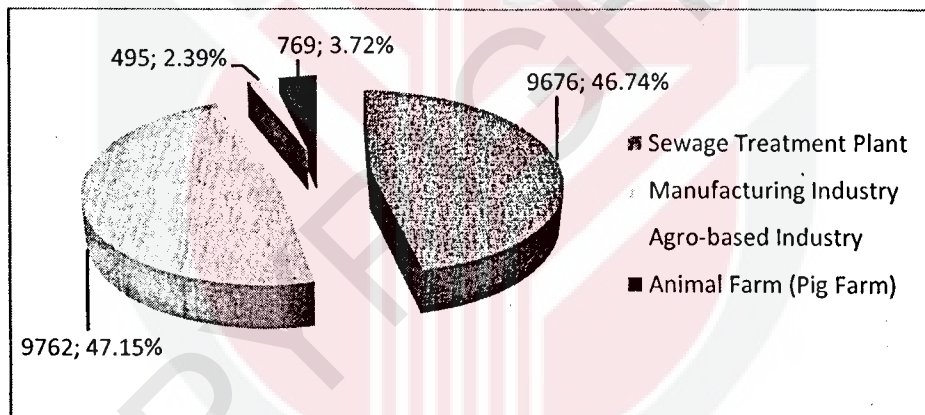


Figure 1.1: Composition of water pollution sources by sector, 2009

Source: Department of Environment Annual Report 2009

Meanwhile, in relation to air pollution, industries including power stations, motor vehicles and open burning activities remain the major sources of air pollution in the country. In Malaysia, local emissions play very important roles in determining the atmospheric environment status (Eltayeb et al., 2010b). It is estimated that in 2009 the combined air pollutant emission load was 1,621,264 metric tonnes of carbon monoxide;

756,359 metric tonnes of nitrogen dioxide; 171,916 metric tonnes of sulphur dioxide and 27,727 metric tonnes of particulate matter (Department of Environment, 2010). As in past years, motor vehicles remain the major contributor of air pollution especially in urban areas. From the statistics, it was found that manufacturing industry lead (49%) in particulate matter (PM) emission load in 2009 compared to other sources.

1.1.1.3 The Malaysian Government's Plans and Efforts to Curb Pollution in the Manufacturing Industry

The Malaysian government has made various efforts to ensure environmental sustainability. Through the Ministry of Energy, Green Technology and Water, the government aims to promote high impact research and development of green technologies in Malaysia. Thus, the Green Technology Financing Scheme was set up by the government to this end. Government efforts in leading green initiatives will not be successful however without private and corporate participation. Nowadays, most large multinational corporations (MNC) include a Corporate Social Responsibility (CSR) component into their activities as reported in their Annual Reports. However, few Small and Medium Enterprises (SME) practice the same approach.

Seeking to attract more foreign investors and reduce the environmental impact of manufacturing industry, a number of incentives have been offered by the Malaysian government. Activities that are eligible for government incentives are storage, treatment and disposal of toxic and hazardous wastes, waste recycling activities, energy conservation and energy generation activities using renewable energy resources. For these types of

activities, the basic incentive offered is pioneer status with income tax exemption of 100% of statutory income for ten years. Unabsorbed capital allowances as well as accumulated losses incurred during the pioneer period can be carried forward and deducted from the post pioneer income of the company; or investment tax allowance of 100% on the qualifying capital expenditure incurred within a period of five years. This allowance can be offset against 100% of the statutory income for each year of assessment. Any un-utilized allowances can be carried forward to subsequent years until fully utilized (MIDA, 2010).

Besides that, the government also enforces rules and regulations that relate to environmental pollution by the manufacturing industry. For example, between 2006 and 2010, 46 factories were fined by the Department of Environment (DOE) for effluent emissions to rivers over the allowed standard (Norizan, 2010). These 46 factories were also prosecuted in court.

As one of the approaches to promote and raise awareness of pollution prevention practices among manufacturers, the concept of cleaner production was introduced by the Cleaner Production Unit, Department of Environment. The implementation of cleaner production activities in 2009 are based on five components of the strategy outlined in the Ninth Malaysia Plan (2006-2010). According to the department, the five components are:

1. Cleaner production awareness and promotion programs for industries;
2. The promotion program on cleaner production through information dissemination;
3. Development program of capacity building on cleaner production and working network;

4. Training module development program on cleaner production; and,
5. Research and development program on cleaner production audit, cleaner production demonstration project and evaluation of methods of cleaner production

(Source: Department of Environment, 2009)

According to the 2009 Companies Commission of Malaysia annual report, the number of companies registered in the manufacturing sector increased in the last three quarters of 2009 consistent with the recovery trend of the Malaysian economy. The details of registration for new companies are recorded in Table 1.2:

Table 1.2 : Number of manufacturing related new registrations by quarter (Year 2008 – 2009)

Year	Registration of New Companies			
	Q1	Q2	Q3	Q4
2009	440	597	664	603
2008	494	533	515	425
Changes	10.90%	12%	28.90%	41.80%

Source: Companies Commission of Malaysia Annual Report 2009

The significant increase is attributed to better performance in the electrical and electronics industry due to increased global demand and rapid expansion in the automotive industry in China and India resulting in higher demand for electronic parts and equipment. Thus, it is expected that the number of new manufacturing companies will increase for the following years (CCM, 2009). In conjunction with that, since manufacturing firms contribute highly to pollution problems, the Malaysian government needs to take serious action in reducing pollution without neglecting the growth of manufacturing industry.

1.2 Problem Statement

Economic development occurs in every corner of the world. As it does so, patterns of economic consumption also increase the level of energy and material usage, which affects the sustainability of the environment. This scenario also leads to an increasing amount of waste, whether solid, liquid, or hazardous. Manufacturing industry is not excluded from contributing to the deterioration of environmental sustainability. Consequently, the concept of green supply chain management (GSCM) is now gaining importance since it can help to enhance the competitive advantage of the business through an eco-friendly approach.

As compared to the developed countries, firms in developing countries like Malaysia are still in the learning process on how to incorporate the 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 business on the environment. However, this issue has been incompletely explored especially in the Malaysian context (Eltayeb, Zailani and Filho 2010a). Thus, this study intends to bridge the gap by examining the relationships between the drivers, practices and performances within the field of green supply chain management practices in Malaysia. The effect of partner relationship (trust and commitment) strengths on the relationship between green practices and performances is also examined in this study.

Understanding the drivers and factors for adopting GSCM practices within manufacturing firms operating in Malaysia is crucial. Apart from sparse research in GSCM

focusing on Malaysian samples, there are also several gaps in the body of knowledge in GSCM that could be addressed by this research. Moreover, green issues are new, dynamic, and still evolving. Constant study is needed to fully understand and update knowledge in this area.

Earlier studies suggest that different types of drivers have different relative levels of importance (Holt and Ghobadian, 2009), as most of the frequently cited drivers for the firms to practice the GSCM were legislation based (Murphy, Poist and Braunschwig, 1995; Rao, 2002). Previous research in green supply chain management has emphasized drivers or antecedents of GSC practices (Zhu and Sarkis, 2006; Holt and Ghobadian, 2008; Allen & Wei Hsu, 2010; Eltayeb et al. 2010b). Some previous research categorizes the drivers for the participation in green initiatives in terms of upstream and downstream operational activities (Carter and Ellram, 1998; Green, Morton & Ne, 1996; Elwood & Case, 2000). Findings from prior studies have suggested that different types of drivers have different relative influence on the green practices. For example, legislation is most frequently cited as the most important driver in green initiatives adoption (Murphy et al, 1996; Rao, 2002; Zhu and Sarkis, 2004; Eltayeb et al. 2010b).

Drivers in Malaysia may be different from the other Western countries due to the differences in organizational cultures, legislation and economic conditions. For example, decision making processes in Malaysia tend to rely on top management responsibility and do not apply the team oriented approach (Nerina, 2003) as compared to Japanese corporations that practice consensus decision making (Ouchi and Jaeger, 1978; Iaquinto and Fredrickson, 1997). Although developing countries in the South East Asian region

such as Malaysia, Thailand, the Philippines, Indonesia and Singapore may have similar markets and socio-cultural situations on GSCM practices when compared to Chinese enterprises (Sarkis, 2003), drivers to GSCM practices could be different due to organizational culture practices. Through the identification of the related drivers for Malaysian industry, it is hoped that understanding beyond these issues can be achieved in determining the related drivers for manufacturers in the local context.

Previous research has reported that GSC practices affected performance. For instance, it was found that GSC practices were positively related to a firm's performance (Rao and Holt, 2005; Zhu and Sarkis, 2004; Zhu, Sarkis and Geng, 2005). Most of the performance measures in the previous studies were economic and environmental (Zhu, Sarkis and Lai, 2007; Zhu et al., 2005). The study in the Malaysian context by Eltayeb et al. (2010b) found that outcomes for environmental initiatives were environmental, economic, in addition to company brand image and reputation. But the previous findings also revealed that different practices lead to different performance. Firms that adopt green purchasing and eco-design practices will have better environmental performance compared to firms that implement other green initiatives (Zhu et al., 2007). Contrary to the economic performance, the same study also revealed that eco-design practices lead to a decrease in the organizational performance since it needs additional investment. Another mixed result was found by Eltayeb et al. (2010b) which noted that reverse logistics was significant only with cost reduction measurement, while green purchasing was not found to have a significant effect on any of the outcomes measured. These literature reviews indicate mixed results when it comes to the performance outcome of green initiatives by the firms.

Therefore, this research investigated the performance outcomes of companies adopting GSCM practices in the Malaysian context.

In this study, performance will be measured by environmental and firms' performance in terms of market, financial and customer satisfaction. Some previous research indicates that the application of green initiatives will increase cost (Wagner, Schaltegger and Wehrmeger, 2001). However, some argue it should reduce cost in the long run (Bowen, Cousins and Lamming, 2001). The relationship between green initiatives and performance has been subject to numerous studies but the results are still mixed (Eltayeb et al. 2010b). Therefore, this research will measure performance in terms of environmental outcomes and firm outcomes that refer to financial and market performance and customer satisfaction to evaluate the real situation of GSCM outcomes in a Malaysian context. Since previous studies have focused more on environmental and economic performance, this research will also look into customer satisfaction dimensions since it is one of the major objectives in supply chain performance of the manufacturing companies (Christopher, 1992).

Meanwhile, research within the area of supply chain management has long identified that partner relationships (trust and commitment) are very crucial for excellent supply chain performance (Ramayah, Sang, Omar and Dahlan, 2008; Li, Ragu-Nathan and Ragu-Nathan, 2006; Chen and Paulraj, 2004). High levels of trust and commitment among supply chain partners is essential in the information sharing process. A close relationship between two parties in the supply chain can facilitate cleaner production. With the trust elements in the collaboration process, information or knowledge exchanged between

partners will be more accurate (Currel and Judge, 1995). For example, if there any specific requirements in providing the raw materials for production, firms can trust their suppliers and do not have to monitor and evaluate their supplier's activities. There is a need to explore the role of effective trust and commitment in the relationship between GSCM practices and performance since little attention has been devoted to understand the link between them and a moderating variable was expected to be the potential elements that influencing the breadth and depth of GSCM among manufacturers (Holt and Ghobadian, 2009).

1.3 Research Questions

There are several research questions to be clarified pertaining to this study. The research questions are:

1. What are the drivers for the participation of manufacturers in Malaysia in green supply chain management?
2. What is the level of green supply chain management practices within manufacturers in Malaysia?
3. How do green supply chain management practices affect the green supply chain performance?
4. How does trust and commitment affect the relationship between green supply chain practices and green supply chain performance?

1.4 Research Objectives

This study intends to investigate the following research objectives in the context of manufacturing firms in Malaysia.

1.4.1 General Objective

The general objective of this study is to examine the drivers, practices and performance outcomes of GSCM within manufacturing companies in Malaysia.

1.4.2 Specific Objectives

The specific objectives of this study are:

1. To measure the drivers, practices and firms' performance of green supply chain management (GSCM) among manufacturers in Malaysia.
2. To examine the relationship between GSCM drivers and GSCM practices within firms; and in turn examine the relationship between GSCM practices and GSCM performance.
3. To examine the moderating effect of trust and commitment on the relationship between GSCM practices and GSCM performance.

This will ensure, by the justification of this research, the importance and need for green supply chain practices in the world market generally and Malaysia specifically. The efforts that have been taken by the Malaysian government will then be delineated for better understanding.

1.5 Significance of the Study

Findings from the proposed study will contribute to two major areas. This section will discuss the theoretical and management implications of the study.

1.5.1 Theoretical Implications

This study has importance in relation to theory building because it:

- a) Improves the understanding of GSCM issues and scenarios

Findings from this study are beneficial to the body of knowledge in green supply chain management through the growing importance of environmentally friendly operations and processes in today's world. It is an extension of previous studies through looking in more depth into the drivers of GSCM practices. The need for continuous research that could enhance the understanding of the link between GSCM drivers, practices and performance was one of the motivations of this study. Specifically, this study contributes to a greater understanding of the dimensions of critical issues such as the factors influencing firms to think and act green. In addition, identification of these critical issues in GSCM permits any following academic researchers to proceed with the task of developing and testing theories of GSCM.

Understanding the concept of a green supply chain within the context of manufacturers in Malaysia is very important as the underlying values of Malaysian culture need to be considered when adopting western strategies or any management principles (Zabid and Saidatul, 2007). Values of certain countries play a significant role in

determining and practicing workforce culture and influencing managerial practices (Zabid, Sambasivam and Abd Rahman, 2004), such as in green supply chain practices. For example, in GSCM practices we need to consider values because the green approaches are extension of traditional supply chain and need extra effort from workers and management to implement it successfully. Readiness to change and adapt in the fast way are very important criteria to be emphasized by firms that implement GSCM. Thus, the norms of Malaysian workforce cultures' need to be examined in order to fit it with GSCM practices.

Meanwhile, to the best of the researcher's knowledge, the influence of competitive pressure as the driver for firms to adopt the green supply chain practices in Malaysia scenario remains unknown. This driver is relatively important since Malaysia's economy depends on product sales to foreign countries. Malaysia also needs to compete with other developing countries in international markets especially considering the emerging prominence of China and India in the world's economy.

b) Study the GSCM in holistic approach

The model proposed in this study is more comprehensive compared to previous studies because it looks in depth at the GSCM drivers, practices and performance through a quantitative survey supported by interview findings. The drivers for firms' participation in GSCM will be measured from internal and external perspectives. It is very important to know the influence of both types of drivers to strengthen the theoretical building process since the different drivers are believed to affect different types of businesses in different ways. By knowing this, future research will focus more on the right drivers to get accurate results and findings. Furthermore, the study not only investigates the relationships between

GSCM drivers and practices, but it also examines their linkage with firms' performance in term of market, financial, customer satisfaction and environmental measurement compared to previous studies that focused more either on just GSCM drivers and practices (Lee, 2008; Hu and Hsu, 2010; Holt and Ghobadian, 2009) or on green initiatives and performance (Zhu and Sarkis, 2004; Zhu and Sarkis 2006; Rao and Holt 2005). Hence, by considering the impact of green practices on multiple performances this study could reveal more about the relationship between those variables. It is expected that the direct relationships between GSCM practices overall and performance studied in this research is very promising in relation to indicating the future path of green movements among manufacturers in Malaysia. For example a positive significant relationship between GSCM practices and environmental performance could indicate the benefits gains from the adoption of GSCM initiatives. Indirectly, it also can promote the green movements among manufacturers in Malaysia.

The qualitative study by Eltayeb et al. (2010a) indicated that the most adopted green initiatives in Malaysia are eco-design and green purchasing. These findings were derived through interviews with one certifying firm in Malaysia and two certified companies that are considered to be large organizations in terms of number of employees. Although the findings from the study by Eltayeb et al. (2010a) has provided a rich understanding of GSCM practices, a study using a quantitative approach and incorporating comprehensive drivers, practices and performance implications is needed to add more understanding on this issue. From the quantitative research, the findings can be generalized to the whole population in the study area. Furthermore, this study will categorize the

respondents into an operational typology by using the level of GSCM activities similar with Holt and Ghobadian (2009); Bowen et al. 2001; and Henriques and Sadosky (1999). The operational typologies are proactive, high average, low average and laggards. It is essential to know the level of GSCM practices within the manufacturers in Malaysia as this information can enhance our understanding of the Malaysian scenario.

c) Provides a new way of looking at the role of moderator effects

Trust and commitment were expected to have moderation effects for some level of performance in green supply chain activities. A review of the literature (Ramayah et al. 2008; Li et al. 2006; Chen and Paulraj, 2004) shows that trust and commitment were very crucial elements in the supply chain process. Both of the practices are well known as factors that can improve supply chain performances. It is important to consider these two supply chain practices (trust and commitment) as the moderation effect so as to know whether the existence of these basic supply chain practices can enhance GSCM performance. Holt and Ghobadian (2009) suggest that green operational activity may be also moderated by other practices and contingencies that might lead to variability in performance. Maybe one of these two supply chain practices has negative or no moderation effect in any relationship between GSCM practices and performances, thus it will be beneficial for future research to provide a new way of looking at the role of moderation effects. Through this study, it could help future researchers to determine which supply chain practices can suit GSCM practices. Findings from this study can also be used as a reference to investigate any additional variable that may moderate the relationship between practices and performance. The treatment of trust and commitment as a

moderating construct could add links to the relationship between GSCM practices and GSCM performance which previous studies have not modelled. Moreover, perhaps mixed results in past studies (Wagner et al. 2001; Bowen et al., 2001; Eltayeb et al. 2010b) which examined relationships between green practices and performances could be explained by the existence of this moderator.

1.5.2 Managerial Implications

In terms of managerial and policy implementations, this study will;

- a) Enhance managers knowledge in GSCM

In this research, the respondents were selected through the list of companies that certify with ISO 14001 in the Federation of Malaysian Manufacturers (FMM) 2010 directory. Thus, it is expected that all the firms that were involved in the survey have adopted at least one of the green practices. Through this study, managers can determine which activity in their operation could lead to better performance. For example, good practice in reverse logistics can lead to cost reduction within operations and at the same time, it will increase firms' financial performance. The objective of business is to maximize shareholder wealth, so findings from this study can support this objective and provide managers with the means to maintain and promote activities that can give high return and at the same time minimize the environmental impact to ensure business survival in the market. Not all the practices that have been discussed in relation to green activities are suitable for all firms. The activities depend on type of products manufactured by the firms. For example, manufacturers in chemical and adhesive production may have several

practices in their operations and tends to involve more on green purchasing rather than reverse logistic because of the nature of products. Thus through the findings of this study, top management can decide which practices to focus on that they believe really suit their needs and capabilities.

b) Shows firms their level of green practices

In order to remain competitive and sustainable in the dynamic business world today, firms must be aware and responsive to environmental issues. Greening the supply chain has been seen as means to respond to environmental awareness issues from the perspective of the practitioner (Rao, 2002). Green supply chain management (GSCM) is a method to design and/or redesign the supply chain which incorporates recycling and remanufacturing into the production process. This involves the minimization of a firm's total environmental impact from the start to the finish of a supply chain, and also from the beginning to the end of the product lifecycle (Beamon, 1999). Therefore, GSCM continue to be an important research agenda amongst practitioners and researchers.

This research will also examine the level of green practices in the firms surveyed. The GSCM activities will be used to cluster respondents into an operational typology, similar to that used by Bowen et al. (2001), Henriques and Sadosky (1999) and Holt and Ghobadian (2009). The operational typology will be divided into 4 of which; the highest will be proactive, the second highest will be high average, the third level is low average and the last one will be named laggards. This typology is very important for both managers and policy makers as a benchmark of their green practices. Since the unit of analysis for this study are manufacturing companies with ISO 14001 certification, it is expected that

the level of their green practices will be at least average. For managers, they can use this information to build up their standard of practices to achieve more than their competitors. Nevertheless, this scenario will encourage healthy competition between the industry players. Meanwhile, for policy makers, they can use this operational typology to encourage firms to adopt and involve themselves more in green practices and offer different kinds of incentives to the high achievers.

c) As an assessment of the government efforts in introducing green practices

Developing countries like Malaysia face great challenges in ensuring a balance between development and environmental sustainability. In South East Asia, greening the supply chain is a relatively new concept and perhaps only a few companies are actually able to implement it (Rao, 2002). Although Malaysia is one of the most industrially developed countries in the ASEAN region, many Malaysian firms however, have yet to grasp the full impact of the environmental emphasis in the export market (Eltayeb et al., 2010a).

Since the establishment of Ministry of Energy, Green Technology and Water in April 2009, endless efforts have been made by the Malaysian government to introduce green practices to industry and the public. In the budget speech for 2010, Dato' Seri Najib Tun Abdul Razak, the Prime Minister of Malaysia announced the establishment of Green Technology Financing Scheme amounting to RM1.5 billion as an effort to improve the supply and utilization of Green Technology (Economic Report, 2010). The scheme could benefit companies who are producers and users of green technology. As a sign of commitment, the Government will bear 2% of the total interest/profit rate. In addition, the

Government will provide a guarantee of 60% on the financing amount via Credit Guarantee Corporation Malaysia Berhad (CGC), with the remaining 40% financing risk to be borne by participating financial institutions (PFIs) (Budget 2010). Hopefully, findings from this study can be an early assessment of numerous government efforts that have been made before; not only for the responsible Ministry, the findings also can also be used by other related departments such as Ministry of International Trade and Industry, Ministry of Human Resources, Ministry of Finance, Department of Environment and also the Federation of Malaysian Manufacturers to offer any incentives such as tax reduction and rebate or provide specific training to firms that are actively involved in GSCM as part of the green technology within their operations. The understanding and awareness of green technology among ministries must increase if the government wants to achieve its target to reduce carbon emissions by 40% by 2025 (Berita Harian, 2010).

1.6 Scope of Study

This study focuses on manufacturers in Malaysia that are registered with the Federation of Malaysian Manufacturers and are certified with EMS ISO 14001 certification as the population. ISO 14001 certified firms were selected because they are expected to be involved in the adoption of green supply chain management. The sampling frame was obtained from 41st FMM Directory 2010 of Malaysian Industries. As at 2010, there were 378 manufacturing firms certified with ISO 14001 in Malaysia (FMM, 2010). The unit of analysis of this study is the manufacturing firms. The population of this study consists of all ISO 14001 certified manufacturing firms that register with FMM. Since the number of FMM members that are certified with ISO 14001 were only 378 companies, this

study used the census method to collect data from the whole population. By using this method, all the samples were selected as respondents of this study. Census is the appropriate method for this study because of the small population of only 378 companies. Since this research was a combination of green issues and firms' operations, the best person to be the respondent for each firm was the person who has knowledge and information about the two fields. SIRIM Malaysia, as the certification organization for ISO 14001 usually appoints an Environmental Management Representatives (EMR) to act as a link between the certification organization and the certified firms (Eltayeb et al., 2010).

1.7 Organization of the Thesis

This research will be organized into 6 chapters as follows:

In chapter one, the background of environmental problems and concerns of the consumers are discussed, along with the action that has been taken within the international or local communities. This chapter also outlines the problem statements, objective of the research, research questions, and also the scope of the study.

The next chapter shall discuss a review of the literature and past research done in the area of green supply chain management including the drivers, practices and performance outcomes. In addition, the basic principles of supply chain management is also stated in this chapter.;

After scrutinizing literature, a conceptual framework was formed to be employed throughout this study. This particular chapter also exhaustively describes the associations of each variable in the study and focuses on specific hypotheses statements.

Then, the methodology of the research is discussed at length in chapter four of the thesis. The discussion includes the sample of the research, methods of data collection, the research instruments and the statistical analysis procedures.

The following chapter discusses the qualitative and quantitative findings from this study. The data analysis and results will be presented within this chapter. The final chapter of the study deals with the discussion of the results, recommendations and conclusion for the study.

1.8 Summary

It is very important for organizations to understand the importance of GSCM practices. Furthermore, best practice of GSCM must be implemented constantly because it leads to continuous improvement for organizations. It is also hoped that this study will further convince the industries that GSCM practices can be implemented in an effective and easy way if the right resources are fully utilized. Greater understanding of the critical dimensions in GSCM will provide valuable information to organizations on how they can enhance the strategy needed to implement GSCM practices. The next chapter will discuss the issues and definitions in GSCM that have been addressed by past researchers.

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