

**EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON
SUSTAINABILITY PERFORMANCE OF ISO14001 SMEs**

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I hereby declare that the work in this project report is my own except for quotations and summaries which have been duly acknowledged

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SHAMSUDDIN

To my lovely mother amazing father. I couldn't have does this without you. I believe that this achievement will complete your dream that you had for me all these many years ago when you chose to give me the best education you could.

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ABSTRACT

Malaysia has moved from agriculture-based economy to an industrial-based economy. As a consequence, manufacturing has increased markedly over the years that results 33.9% contribution to GDP. Literature have shown that of manufacturing activities are responsible for air and water pollution, toxic emission, and chemical spills that have created environmental issues. Globalization has increased customers awareness about environmental issues that introduced business opportunities for environmentally conscious manufacturing industries. Hence, manufacturing industries are facing pressure from global market to improve their **sustainability** performance by implementing environmental management practices. This research aims to determine the level of Green Supply Chain Management (GSCM) practices and investigate their effect on the environmental, economic, and intangible performance. The research adapted survey research design using questionnaire to obtain data of GSCM practices from representatives of Small Medium Enterprises (SMEs) in the study area. The questionnaire was adapted from previous studies, and purposive sampling was used to select respondents. Data were collected from 120 SMEs to test the research hypothesis. The results showed that generally, there is medium implementation of GSCM practices among the studied SMEs which results improved performance. In addition, the results suggest that SMEs should strive to implement GSCM practices from the environmental point of view. Therefore, results clarify SMEs current state to assist both industry and academia on the way toward enhancing performance. It is recommended that more research should be conducted on GSCM practices and their effect on the intangible performance as limited studies were found on this aspect.

ABSTRAK

Malaysia telah mengalami perubahan dari ekonomi berasaskan pertanian kepada ekonomi berasaskan industri. Kesannya, sektor industri telah mengalami perkembangan dan menyumbang 33.9% kepada Keluaran Dalam Negara Kasar (KDNG). Kajian literatur telah menunjukkan aktiviti pembuatan yang menyumbang kepada masalah pencemaran udara dan air, sisa toksid dan tumpahan sisa kimia yang mengakibatkan isu alam sekitar. Fenomena globalisasi telah meningkatkan tahap kesedaran pelanggan terhadap isu alam sekitar dan telah memberi peluang yang positif kepada industri yang menitikberatkan alam sekitar. Oleh itu, sektor industri telah mengalami tekanan peningkatan prestasi terhadap pelaksanaan pengurusan alam sekitar daripada pasaran global. Kajian ini dijalankan untuk menentukan tahap amalan Pengurusan Rantaian Bekalan Hijau (PRBH) dan mengkaji kesannya terhadap alam sekitar, ekonomi dan prestasi tidak ketara. Borang kajian soal selidik telah digunakan untuk mendapatkan data berkaitan amalan-amalan PRBH daripada wakil Perusahaan Kecil Sederhana (PKS) di kawasan kajian. Kaedah persampelan bertujuan telah digunakan untuk memilih responden. Data yang diperolehi daripada 120 PKS digunakan untuk menguji hipotesis. Dapatan kajian menunjukkan tahap pelaksanaan PRBH di kalangan PKS adalah sederhana dan peningkatan prestasi diperlukan. Disamping itu, dapatan kajian juga mencadangkan PKS untuk berusaha melaksanakan amalan-amalan PRBH daripada perspektif alam sekitar. Dengan itu, keadaan semasa PKS dapat membantu industri dan akademik dalam peningkatan prestasi mereka. Kajian lanjut terhadap amalan PRBH dan kesannya kepada prestasi tidak ketara adalah dicadangkan kerana kajian yang dijalankan berkaitan aspek ini masih terhad

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LIST OF ABBREVIATIONS

GSCM	Green Supply Chain Management
ISO	International Organization for Standardization
SMEs	Small and Medium Enterprises
SMECORP	Small and Medium Enterprises Corporation
CCICED	China Council for International Cooperation
MRC	Manufacturing Research Consortium
R&D	Research and Development
GNI	Gross National Income
LCA	Life Cycle Analysis
GPNM	Green Purchasing Network Malaysia
CIRAIG	Interuniversity Research Center for the Life Cycle of Products, Process and Services
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
VIF	Variance Inflation Factor
FMM	Federation of Malaysian Manufacturers
RoHS	Restriction of Hazardous Substances
SIRIM	Standards and Industrial Research Institute of Malaysia
GDP	Gross Domestic Product

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Manufacturing refers to the process of transforming raw materials, components, or parts into merchandise with aid machines for use or sale purpose. Green Supply Chain Management (GSCM) is gaining popularity among organizations and research communities. Globalization impels industries to implement the GSCM practices to be competent in global market, it also provides opportunities for manufacturers to export (Semen et al., 2012). GSCM practices also extend to the entire value chain from supplier to customer when organizations inform buyers of ways to reduce their impacts to the natural environment (Handfield et al., 2002; Miemczyk et al., 2012). Organizations that purchase inputs from a specific supplier also acquire waste from each supplier up the supply chain. These distinctions are important because organizations that adopt GSCM practices generally evaluate the environmental impacts of their first tier suppliers (Handfield et al., 2002). The pressure and drive accompanying globalization has prompted enterprises to improve their environmental performance (Zhu and Sarkis, 2006). Consequently, corporations have shown growing concern for the environment over the past ten years (Sheu et al., 2005). The pressure on corporations to improve the environmental performance comes from globalization rather than localization (Sarkis and Tamarkin, 2005). Increasing environmental concern has gradually become part of the overall corporation culture and, in turn, has helped to reengineer the strategies of corporations (Madu and Madu, 2002).

Globalization provides opportunities for business extension simultaneously it introduces the challenge of GSCM implementation in order to reduce emissions from the industries. Different drivers influenced industries to initiate green practices as a result of environmental concerns become a part of industrial culture which helped industries to reformulate their strategies. Currently industries are practicing GSCM or initiating GSCM practices in their operation. During last decade most of the research was done to analyze the impact of drivers toward the implementation of GSCM practices, since industries implement GSCM practices or initiate to implement, research focus turned toward the impact of GSCM practices on performance (Seman et al., 2012).

1.2 Research Background

The Malaysian economy enjoyed a period of sustained economic growth up until the mid-1997 East Asian economic crisis. Malaysia's high level of economic growth and aspiration of becoming an industrialized nation that has created the environment for growth (Abdulllah et al., 2004). Malaysia now aspires to become a fully developed economy by 2020 (Mansur et al., 2011). As a developing country, Malaysia has moved from an agriculture-based economy to an industrialized economy in which manufacturing is considered to be the highest contributor towards environmental concerns. These concerns push firms into seriously considering the environmental impact while doing their business. The implementation of GSCM is a key enabler that could push organizations to focus on alleviating environmental issues, and providing economic and social benefits (Zailani et al., 2012).

Despite of gaining popularity in Malaysia, there are several companies that are still implementing a more traditional and conventional supply chain. GSCM can be considered as closing the loop (Zhu and Sarkis, 2004a), this is because the "life" of a product does not end when it reaches the consumer but can be reused by the manufacturing companies and be reintroduced into the manufacturing process. This research addresses the sustainability performance of Malaysian ISO 14001 certified manufacturing SMEs. ISO 14001 sets out the criteria for an Environmental Management System (EMS) in manufacturing industries. It does not state requirements for

environmental performance, but maps out a framework that a company or organization can follow to set up an effective EMS, Handfield et al. (2005) stated, ISO 14001 principle provides a framework, which guides firms to implement EMS to improve environment performance only within the firm's operation boundaries instead of through out the supply chain of the manufacturing company.

1.3 Problem Statement

Small and Medium enterprises (SMEs) are playing vital role in development of a country's economic growth and they can be considered as backbone of economic growth in all countries (Khalique et al., 2011; Ghazilla et al., 2015). It has been reported that SMEs contribution to the nation's Gross Domestic Product (GDP) is 32.5 % in year 2011, and these companies aim to contribute 41% of the nation's GDP by year 2020. The Government of Malaysia has drafted plans which requires SMEs to increase workforce from 59 to 61%, increase exports from 19 to 25% and increase number of registered firms from 69 to 85% in Malaysia by year 2020 (The Star, 2013).

Increasing environmental concerns and awareness are the driving force which pushes manufacturers all over the world to adopt green manufacturing practices that results manufacturing SMEs to implement green practices in their business (Ghazilla et al., 2015). The role of SMEs operating in the manufacturing sector is more important in Malaysian economy (Kassim and Sulaiman, 2011). Due to significant contribution of SMEs towards economy, various agencies, particularly that of Government, have given a lot of importance on the development of SMEs. In order to strengthen the SMEs a number of programs conducted to enhance their performance (Khalique et al., 2011). Environmental issues have become a priority for the government and the public (Eltayeb et al., 2011). As the population of the world increases and resource availability decreases, companies are starting to realize that supply chains must be re-designed (Carter and Jennings, 2002). Because of this inevitable problem, many researchers have now claimed that the future of supply chain management is sustainability (Carter and Jennings, 2002, 2004; Murphy and Poist, 2002). Thus, the concept of green supply chain

management (GSCM) is now gaining importance since it can help to minimize negative impact of the industrial processes but can also enhance the competitive advantage of the firms (Rao, 2006).

An extensive review of the literature revealed that simultaneous examination of three dimensions of sustainability (economic, environmental, and social) under the unifying umbrella of sustainability is lacking (Seuring and Muller, 2008). Most of these studies focused primarily on environmental, operational and economic performance (Zhu et al., 2005; Azevedo et al., 2011; De Giovanni and Esposito Vinzi, 2012; Green et al., 2012). The importance of a social dimension to GSCM had been discussed in the literature, primarily in relation to developed economies. Eltayeb et al. (2011) argued that intangible outcomes such as company image, product image, employee satisfaction and customer loyalty or satisfaction had not received much attention as outcomes of GSCM despite studies such as Testa and Iraldo (2010) together with Xie and Breen (2012) asserting that GSCM can result in improved brand image, better relations with stakeholders and improved personnel motivation. Although remarkable research have been conducted to examine the impact of green practices on operational, environmental, and economic performance but lack of research does exist to investigate the impact of green practices on intangible performance along with environmental and economic performance specifically. This study looks into the GSCM practices and their impact on performance of Malaysian ISO 14001 certified manufacturing SMEs situated in Johor listed by Federation of Malaysian Manufacturers (FMM).

1.4 Research Questions

- What are the dimensions of GSCM practices?
- What is the extent of GSCM practices implemented in ISO14001 manufacturing SMEs?
- Does implementation of GSCM practices affect SMEs sustainability performance?

1.5 Research Objectives

- To identify the dimensions of GSCM practices.
- To determine the level of GSCM practices implemented in ISO14001 manufacturing SMEs.
- To examine the relationship between GSCM practices and sustainability performance.

1.6 Research Scope

This research was conducted in Johor, Malaysia and focus amongst Federation of Malaysian Manufacturers (MMF) listed ISO 14001 certified manufacturing firms. The manufacturing firms were selected because it is considered as an important contributor to Malaysian's economy in recent years (Seman et al., 2012). Besides that, ISO 14001 certified manufacturing firms are more likely to be involved in the adoption of GSCM practices (Handfield et al., 2005; Arimura et al., 2011). ISO 14001 principle provide framework which guides manufacturing firms to implement and follow Environmental Management Systems (EMS) to improve environment performance within the operation. The practices incurred in ISO 14001 are such as green purchasing, product related eco-design, packaging related eco-design, reverse logistics, and legislation and regulations were used to examine their effect on sustainability performance communicating the environmental requirement with suppliers, motivating the suppliers and confirming the suppliers that follow the requirements.

1.7 Significance of Research

The purpose of this research is to investigate the impact of GSCM practices upon sustainability performance.

- (I) This study aims to provide a better insight how GSCM practices influence sustainability performance of manufacturing firms.
- (II) It is believed, companies which adopt GSCM practices with focus on green activities will be able to improve their sustainability performance that results enrichment of overall performance.
- (III) The results from this research would help SMEs that are planning, or has completed, the implementation of GSCM practices enhance its operations and better connect their efforts for sustainability performance improvement.

1.8 Conclusion

This chapter is the basic outline of the research study. The research questions and objectives formulated were used as the guidelines when conducting this research. The structure of this research was designed around the research questions and objectives, which are dimensions for evaluation of GSCM practices, types of performance and investigating the effect of GSCM practices on sustainability performance.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review of the main topic relating to area of current study. It also offers an insight on the topic and better understanding about the research objectives. It started with the various definitions of GSCM followed by concept of GSCM from the different authors and difference between SCM and GSCM importance of GSCM, benefits of GSCM. Finally it discusses GSCM in developed and developing countries, GSCM practices, GSCM performance, and SMEs definitions with respect to sales turnover and number of employees.

21st century came with number of opportunities along with various challenges, evaluation of internet transformed the world into a global village which helps organization to find new markets for their competitive products, on other hand natural environment concerns bring global challenge to the manufacturers. According to Baneerjee (2001), environmental concerns have been spread local to regional ones and to global ones. Thus from the perspective of environmental concerns, integration of environmental concerns and Supply Chain Management (SCM) has been in focus for two decades (Sarkis, 2012). Therefore, integrating the environmental concerns into supply chain management has been highly important for manufacturers in order to retain competitive advantage. In spite of gaining importance in industrial countries, there are several areas of Green Supply Chain Management (GSCM) which require more research yet, greening the supply chain has been identified a major issue of sustainable supply chain management (Large and Thomsen, 2011; Kenneth et al., 2012). GSCM is the way to enhance performance of

the process and products by complying environmental regulations (Hsu and Hu, 2008).

According to Schaper (2002), industrial revolution is responsible for human to further progress into current era. Rapid developments of technology lead toward advancement in science that conceived manufacturing age plus pollution. At earlier time industries were small factories and smoke was the main pollutant. However, since the number of factories were limited and worked for certain hours a day, the level of pollution did not grow greatly. Since these factories transformed into full scale industries and manufacturing units, the issue of industrial pollution starts to take importance. In 1960s emergence of environmental concern was viewed first time as a major community issue, especially in wealthy developed countries of Western Europe such as America and Australasia. Governments took initiatives to respond environmental issues in policy making by 1970s. These initiatives were contained of more strict laws to preserve the environment and limit the actions of business, the establishment of regulatory bodies to deal with environmental concerns, and appointing environment ministries and departments at state and national levels. In 1980s and 1990s growing number of managers not only accept but adopt sustainable framework for business practices. Legitimacy of environmental issues had been accepted by most managers which impelled others to propound the philosophy of market- based environmentalism.

This perspective argued that being “green” could in fact be a source of innovation, competitive advantage, and new business generation, and claimed that the most effective way of protecting the environment was to provide an economic incentive for doing so (Kinlaw, 1993). Today there is a well-established and rapidly growing body of research into the “greening” of business which includes frequent conferences, dedicated journals, and industry groups such as World Business Council for Sustainable Development. The development of GSCM during previous fifty years is shown in Table 2.1 which is summarized by Schaper (2002).

Table 2.1: Summary of GSCM development during past fifty years

Year	Key Green Issues Developments
1960s	Environmental concern emergency from some developed countries.
1970s	Government policy initiatives and business exclusions.
1980s-1990s	Sustainability acceptance and innovations from business senior managers and entrepreneurs.
2000s	Fast growing and more systematic research from scholars.

Source: Schaper (2002)

In recent years, studies from various countries have identified several trends that seem common to most of SMEs (Lee et al., 2012; Zailani et al., 2012). In general, majority of small business owners and managers support protection of environment by considering it an important issue. However, it is evident from the studies, poor and limited awareness exists about formal environmental management system, specific environmental laws and remediation processes (Schaper, 2002). Studies also showed, SMEs are less likely to embark on environmental improvement programs, writing environmental policy, implementing formal environmental management standards, or undertaking environmental audit.

2.2 Small and Medium Enterprises (SMEs)

According to SMECORP (2013), enterprises are considered as SME based on the requirements stated below.

Table 2.2 Categorization of SMEs

Category	Small Enterprises	Medium Enterprises
Manufacturing	Sales turnover from RM 300,000 to less than RM 15 million OR full-time employees 5 to less than 75	Sales turnover from RM 15 million to not exceeding RM 50 million OR full-time employees 75 to not exceeding to 200
Service & Other Sectors	Sales turnover from RM 300,000 or less than RM 3 million OR full-time employees 5 to less than 30	Sales turnover from RM 3 million to not exceeding RM 20 million OR full-time employees 30 to not exceeding to 75

Source: SMECORP (2013)

According to Census Report on SMEs 2014, there was a total of 645,136 SMEs operating their businesses in Malaysia, representing 97.3% of total business establishments. Refer to number of registered companies and business published by SSM (Companies Commission of Malaysia), there were slightly more than 1 million companies and close to 5 million businesses (Sole Proprietorship & Partnership) registered by the end of 2012. Most of the SMEs establishments are based in Selangor (19.5%) and Kuala Lumpur (13.1%), followed by Johor (10.7%), Perak (9.3%) and Sarawak (6.8%).

Referring to SME Corporation Malaysia, Service sector consists of sub-sectors such as telecommunications, private education, healthcare, finance, insurance, professional and business services, wholesale and retail trade, restaurants and accommodation. Table 2.3 shows 90.1% of the SMEs are classified in Services sector.

Table 2.3 Distribution of Sectors for SMEs

Sector	Micro	Small	Medium	Total SMEs	Total SMEs
	Number of Establishments				% Share
Manufacturing	21,619	13,934	2,308	37,861	5.9
Service	462,420	106,061	12,504	580,985	90
Agricultural	3,775	1,941	992	6,708	1
Construction	8,587	6,725	3,971	19,283	3
Mining & Quarrying	57	126	116	299	0.1
Total SMEs	496,458	128,787	19,891	645,136	100

Source: Census 2014 by Department of Statistics, Malaysia

As stated in census 2014 conducted by Department of Statistics Malaysia, textiles and wearing apparel is the highest sub-sector in manufacturing sector with number of 10,047 establishments. Food and beverage is the second sub-sector whom number is 6,016 followed by fabricated metal products with 3,958 SMEs. Sub-sector distribution of manufacturing SMEs is shown in Table 2.4.

Table 2.4 Distribution of SMEs in Manufacturing Sector by Sub-Sector and Size

Sub-sector	Micro	Small	Medium	SMEs	SMEs Proportion (%)	Total SMEs
Textiles & Wearing Apparel	9,123	872	52	924	5.7	10,047
Food and Beverage Products	3,287	2,233	505	2,738	17	6,016
Fabricated Metal Products	2,070	1,698	190	1,888	11.7	3,958
Printing and Reproduction of Recorded Media	1,717	1,145	56	1,201	7.4	2,918
Machinery and Equipment (Including Repair and installation of Machinery and Equipment)	841	1,178	97	1,275	7.9	2,116
Furniture	886	847	110	957	5.9	1,843
Rubber and Plastic Products	322	1,126	308	1,434	8.9	1,756
Wood and Wood Products	499	791	158	949	5.9	1,448
Non-Metallic Mineral Products	484	758	131	789	4.9	1,373
Basic Metal	431	543	109	652	4	1,083
E and E products	231	639	198	837	5.2	1,068
Chemicals and Chemical Products	271	534	156	690	4.3	961
Paper and Paper Products	283	442	103	545	3.4	828
Motor Vehicles, Trailers etc.	242	440	77	517	3.2	759
Leather and Related Products	219	151	6	157	1	376
Basic Pharmaceutical Products and Pharmaceutical Preparations	60	115	17	132	0.8	192
Coke and Refined Petroleum Products	19	39	5	44	0.3	63
Tobacco Products	30	27	3	30	0.2	60
Others	613	356	27	383	2.4	996
Total	21,619	13,934	2,308	16,142	100	37,861

Source: Census 2014 Department of Statistics, Malaysia

2.3 Definitions of GSCM

GSCM is an action by adding “green components” into supply chain management. Traditional supply chain is the manufacturing process of raw materials into the final products then it is delivered to the customers by the distributor or retailer. Zhu and Sarkis (2004b) defined, GSCM as a set of complex activities such as monitoring environmental management process which contains of purchasing, operations, marketing and logistics beside that recycle, reuse, remanufacture, reverse logistics and innovation are other elements of GSCM. According to Hervani et al. (2005), GSCM involves various activities such as reuse, remanufacturing and recycling, green design, green procurement practices, total quality environmental management, environmentally friendly packaging, transportation and managing end-life products practices.

H'Mida and Lakhel (2007) defined GSCM, the practice of monitoring and improving environmental performance in the supply chain during a product's life cycle. Rettab and Ben Brik (2008) stated, GSCM is a managerial approach that seeks to minimize a product or service's environmental and social impacts or footprint. Torielli et al. (2011) confirmed, GSCM (the integration of both environmental and SCM) is a proven way to reduce a company's impact on the environment while improving business performance. This research is based on following definition for GSCM “a managerial approach formed with the combination of environmental thinking and supply chain management which assists firms to endure their operation by conforming green purchasing, eco-design, reverse logistics, as well as legislation and regulations practices for sake of sustainable performance”.

Green supply chains differ from traditional ones in that GSCM is integrated into the entire process including planning, procurement, production, consumption, and reverse logistics. The entire supply chain is managed as green system and every process focuses on environmental management and risk control. As shown in Figure 2.1

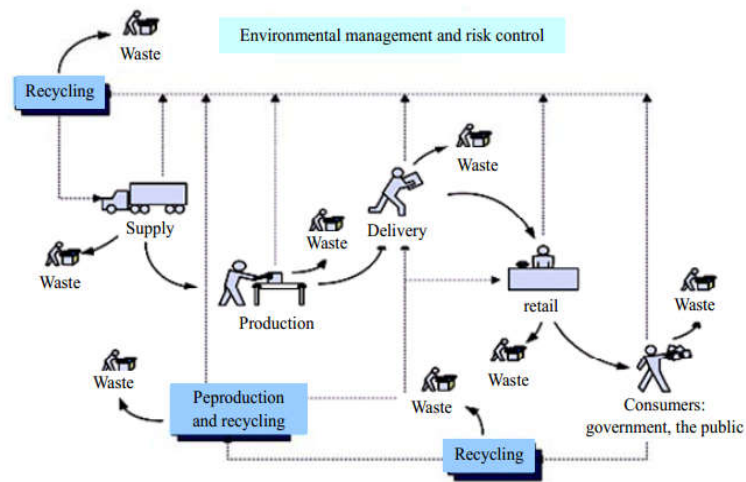


Figure 2.1: Management system of GSCM (China Council for International Cooperation, CCICED AGM 2011)

Based on definitions, GSCM can be summarized as managerial approach derived from environmental concerns, adds green components in supply chain, ranges from selection of material, production, distribution, consumption, till recycling for reduction of environmental impact to achieve sustainable performance.

2.4 Concept of GSCM

The complete concept of GSCM was first proposed by the Manufacturing Research Consortium (MRC) of Michigan State University in the U.S. in 1996, for comprehensively considering environmental impacts and resources optimization of manufacturing supply chains. That is to say, it aims to minimize the environmental impacts of the products end-of-use by tracking and controlling the raw material procurement, in order to ensure compliance with environmental rules and regulations starting from the stage of product R&D.

GSCM concept has ranged from green purchasing to integrated supply chains starting from supplier, to manufacturer, to customer and reverse logistics. Reverse logistics deals with the activities of the various processes which are necessary for returning waste material and used goods to their producer respectively resulting into

the complete economic cycle compared to the traditional unidirectional flow economy. Consequently, Srivastava (2007) viewed GSCM as an integration of the environmental thinking into supply chain management, started with product designed, material resourcing and selection, manufacturing process, final product delivery reaching the end consumer, and the end-of-life management of the product after its useful life. This generates on one hand advances towards sustainable development on the other hand considerable cost reduction to some or even all of the enterprises involved.

The awareness about the environmental pollution increased among people around the world which made them curious about the protection of environment as a result people intend to buy green products and concept of green supply chain management got more popularity. Governments in various countries enforcing comprehensive laws to save the environment for upcoming generations. GSCM has gradually become into the new concept for the sustainable development of the enterprises. However, it is not the simple problem of concept to really implement the GSCM in enterprises, and there are large numbers of works to do Zhou (2009). In recent era manufacturing industries are facing tremendous pressure for the implementation of GSCM as result managers do not have to address social and environmental goals only but they have to achieve those goals. To ensure complete environmental excellence, top management must be totally committed (Rice, 2003). Moreover, manufacturing firms have initiated implementation of green supply chain management (GSCM) practices to meet customers demand for environmentally sustainable products and services that are produced by complying government environmental regulations (Murray,2000). Green design contains of two fundamental tools known as life-cycle assessment (LCA) and design for environment (DfE). According to United States Environmental Protection Agency, LCA is technique to assess the environmental aspects and potential impacts with a product, process, or service by: (1) Compiling an inventory of relevant energy and material inputs and environmental releases, (2) Evaluating the potential environmental impacts associated with identified inputs and releases, (3) Interpreting the results to help you make a more informed decision. LCA typically provides two types of information, a comprehensive life-cycle inventory of relevant energy and material inputs and environmental releases throughout the system, and estimates of the resulting impacts

for a wide range of impact categories including global climate change, natural resource depletion, ozone depletion, acidification, eutrophication, human health, and ecotoxicity. Design for environment acknowledges that design determines a product's materials and the processes, by which the product is made, shipped, used, and recover (Larson, 2000). Therefore, Design for environment can be used to avoid toxic materials from the outset; minimize energy and material inputs; and facilitate disassembly, repair, remanufacturing. Hence concept of GSCM can be summarized by saying it is an idea originated from sustainability, resides in the minds, defines company's goals, flows from product design toward selection of raw material and then streams through manufacturing, distribution till consumption of product, finally retrieves consumed products by using reverse logistics and feeds back those products in supply chain.

2.5 Difference between SCM and GSCM

There are several differences exist between SCM and GSCM. China Council for International Cooperation (CICED, 2011) reported five differences between SCM and GSCM in terms of goal, management structure, business model, business process, and consumption pattern. In term of goal, GSCM targets to decrease the consumption of the resources, energy, as well as emissions of pollutants to achieve environmental goals primarily and gaining economic benefits secondarily while conventional SCM targets to minimize the cost and enhance the supply chain efficiency so that it could help to increase economical benefits. Unlike to GSCM, environmental performance neither includes for internal management nor external management in SCM. Business model for GSCM is more complete comparing to SCM because conventional supply chain does not deal with low carbon and environmental protection. For business process GSCM implement recycle approach which is derived from cradle to reincarnation as result reverse logistics is added in GSCM while traditional supply chain product flow is one way and irreversible in nature. Differences between GSCM and SCM are summarized in Table 2.5.

Table 2.5 Difference between the Green Supply Chain Management and traditional Supply Chain Management

Characteristics	GSCM	SCM
Goal	Green supply chain seeks to maximize the economic benefits by decreasing consumption of resources, energy, and emission of pollutants to create socially responsible enterprises.	The conventional supply chain aims to lower the cost and improve the efficiency of supply chain to maximize the economic benefits
Management Structure	Environmental performance is included in the enterprise's internal and external management.	Environmental performance is not included in enterprise's internal and external management which is a lacking.
Business Model	Business model for green supply chain is more complete because it introduces low carbon and environmental protection.	Business model of conventional supply chain is less complete comparing to green supply chain as it does not deal low carbon and environmental protection.
Business Process	Green supply chain based on "cradle to reincarnation", product flow is circular and reversible and all products must be managed throughout entire life cycle beside that waste finds a second life or becomes raw material for new production or other purpose.	Traditional supply chain start with suppliers and ends with users, product flow is one way and irreversible known as "cradle to grave".
Consumption Pattern	Green supply chain can be promoted through green government procurement, corporate social responsibility, and sustainable practices.	The consumption pattern of traditional supply chain is a voluntary initiative governed by consumer interests and business activities.

Source: (CCICED, 2011)

2.6 Importance of GSCM

Globalization increased the opportunities for the buyers, with the rapid change in global manufacturing scenario, environmental and social issues are becoming more important in managing any business. The waste and emissions caused by supply chain become one of the main sources of serious environmental problems including global warming and acid rain. GSCM is an approach to improve performance of the process and products according to the requirements of the environmental regulations (Hsu and Hu, 2008), it is recognized as a direct and effective mechanism to address environmental problems along with global supply chain. GSCM enables firms to reduce negative environmental effects by minimizing wastage, decreasing the use of harmful materials, recycling products and their wastage and limit the pollution via cleaner production.

The degradation of environment impels stakeholders to deal with environmental issues effectively, several groups and associations are trying to preserve planet green while pollution continues to affect many parts of the world especially in industrialized country. Industrial growth is the main cause of degradation. According to (Beamon, 1999), waste generation and natural resource use, primarily attributed to manufacturing, contribute to environmental degradation. Moreover scarcity of the resources is other aspect to be considered by industries. Therefore, Green Supply Chain Management (GSCM) is the way to deal with these issues because GSCM is driven mainly by the escalating deterioration of environment, e.g. diminishing raw material resources, overflowing waste sites and increasing level of pollution (Kumar and Chandrakar, 2012).

Since environmental issues and scarcity of resources are hinders to achieve sustainable performance, GSCM is the philosophy to optimize the performance in unfavorable conditions. It has potential to minimize environmental impacts of manufacturing by introducing eco-design approach which helps to use environment friendly materials so that environmental impact decreased whereas production efficiency increase in from of reduction in emission. GSCM introduces reverse logistics approach that assists manufacturers to recycle the products after consumption as result overall consumption of raw material decrease which provide solution to the scarcity of resources as well as to the degradation of environment.

2.7 Benefits of GSCM

One may only think of banning toxic chemical substance usages or reducing emission and waste to the environment when considering green supply chain practice. Yet it is much more than merely reducing usage and pollution. The benefits of GSCM are not limited to less toxic consuming or less waste. The GSCM principle can be applied to all departments in the organization.

There are numerous studies that mentioned the benefits of adopting GSCM. Duber-Smith (2005) identified ten reasons that the company should adopt green: target marketing, sustainability of resources, lowered costs/increased efficiency, product differentiation and competitive advantage, competitive and supply chain pressures, adapting to regulation and reducing risk, brand reputation, return on investment, employee morale, and the ethical imperative.

In the manufacturing process, the company can apply “green” by several methods to reduce energy and resource consumption, reuse and recycling are imperative. Several papers provided green practices such as Duber-Smith (2005), he suggested some practices including reducing energy consumption, recycling and reuse, using biodegradable and non-toxic materials, minimizing harmful emissions, and minimizing or eliminating waste. In a Chinese sugar manufacturer, Guitang Group can reduce waste and improve their financial performance by using waste from the upstream as raw materials for downstream production (Zhu and Cote, 2004).

Industrial revolution has enhanced manufacturing process that resulted faster production together with higher quality of the product. On one side it enabled industries to meet human needs despite of growth in population around the globe simultaneously it is responsible for the deterioration of environment. GSCM assist to minimize the environmental impacts of massive production, it does not only decrease environmental product but it cause to improve organizational performance. It helps to improve brand image as well as company’s image and increase the profitability.

2.8 GSCM in Developed Countries

According to the World Bank developed countries refer to the countries where high level of development does exist based on certain characteristics. These characteristics consist of economic, industrializations and Human Development Index (HDI). Income per capita is the indicator for economic characteristics. Countries with high income or gross domestic per capita can be categorized as developed countries. Developed countries have post-industrial economies which mean service sector provides more wealth than industrial sector. Several researchers conducted research in developed countries to analyze the integration of environmental concept and SCM (Seman et al., 2012).

There are available studies that investigated the environmental, economic and operational outcomes of Green Supply Chain Management (GSCM). The study of the outcomes of GSCM is expected to show, how effectively the green supply chain initiatives are implemented. The past conducted studies had shown that there is significant relationship between GSCM practices with operational performance (Szwilski, 2000; Tooru, 2001).

One research was done by Holt and Ghobadian (2009) in UK, research examined the extent and nature of greening the supply chain in manufacturing sector, it also identified those factors which influence the breadth and depth of green supply chain. Results of the research showed greatest pressure to increase the environmental performance was legislation and regulation furthermore research revealed GSCM practices among manufacturers focus on internal risk and descriptive activities. Nawrocka et al. (2009), conducted their research about the role of ISO 14001 in environmental supply management practices in Swedish companies, research showed that ISO 14001 has a facilitating role in the environmental activities between customer and supplier. Zhu et al. (2010), introduced GSCM experience of large Japanese manufacturers, GSCM practices were used to analyze the performance outcome. Results of the research showed internal environmental management implementation at Japanese manufacturing industries is higher comparing to Chinese manufacturing industries besides that finding of the research indicated GSCM practices improved environmental and financial performance of manufacturing industries significantly but it did not improve operational performance.

Green et al. (2012), investigated the impact GSCM practices on performance in US based manufacturing organizations, results of the research indicated GSCM practices leads manufacturing organizations toward enhanced environmental and economic performance that results positive impact on operational performance which cause improvement in organizational performance. Lee et al. (2012), explored GSCM practices and their relationship with organizational performance, this study proved indirect relationship does exist between GSCM practices and business performance through mediating variables of operational and relational efficiency. Tachizawa et al. (2015), analyzed the complex interrelationships among environmental drivers, Green Supply Chain Management (GSCM) approaches and performance, results showed that firms needs to adopt collaborative practices with their supplier in order to improve their sustainability performance. Paulraj et al. (2015), investigated the motives of firm's engagement toward sustainable supply chain management, results of the research revealed relational and moral motives were responsible for implementation sustainable practices in German firms. Choi et al. (2015), examined the impact of GSCM practices toward performance in Korean firms, findings of the study showed green practices caused improvement of environmental and financial performance.

Table 2.6 showed the summary of previous studies done on GSCM in different developed countries. These few previous studies have been referred throughout this study as they have more close relation with the topic. These studies are done at UK, Sweden, Japan, US, Korea, Spain, and Germany.

Table 2.6: Summary of research held in developed countries

Year	Title and Author	Finding and Conclusions	Country
2009	An empirical study of green supply chain management practices amongst UK manufacturers Holt, D. and Ghobadian, A.	<ul style="list-style-type: none"> Manufacturers identify the greatest pressure to increase environmental performance is legislation and internal drivers. GSCM practices among the UK manufacturers are focusing on internal higher risk, descriptive activities. Environmental attitude is a key predictor of GSCM activity and those organizations that have progressive attitude are also operationally very active. 	UK
2009	ISO 14001 in environmental supply chain practices Nawrocka et al.	<ul style="list-style-type: none"> ISO 14001 has a facilitating role in the environmental activities between a customer and a supplier. Closer relationship with suppliers was seen as beneficial both for successful outcomes and projects as a facilitator 	Sweden
2010	Green supply chain management in leading manufacturers - case studies in Japanese large companies Zhu et al.	<ul style="list-style-type: none"> Japanese large manufacturers implement one key GSCM practices, internal environmental management at a significantly higher level than Chinese manufacturers. Large Japanese companies have made significant improvements for environmental and financial performance but not for operational performance. 	Japan
2012	Green supply chain management practices: impact on performance Green et al.	<ul style="list-style-type: none"> Green supply chain practices by manufacturing organizations leads to improved environmental and economic performance results positive impact on operational performance which enhances organizational performance. 	US
2012	Green supply chain management and organizational performance Lee et al.	<ul style="list-style-type: none"> Indirect relationship between GSCM practices and business performance through mediating variables of operational efficiency and relational efficiency. Collaboration between SMEs suppliers and large buying firms improves implementation of GSCM practices, relational efficiency results better business performance. 	Korea
2015	Green supply chain management approaches: drivers and performance implications Tachizawa et al.	<ul style="list-style-type: none"> Firms need to adopt collaborative practices with their suppliers. Collaborative efforts between buying firms and suppliers are needed to improve sustainability 	Spain

2015	Motives and performance outcomes of sustainable supply chain management practices: A multi-theoretical perspective Paulraj et al.	<ul style="list-style-type: none"> • Relational and moral motives are key drivers to implement sustainable supply chain management. 	Germany
2015	The impact of green supply chain management practices on firm performance: the role of collaborative capability. Choi et al.	<ul style="list-style-type: none"> • Implementation of GSCM practices improve both environmental and financial performance of a firm. • Firms can expect improved financial performance when they seek synergistic effect by involving their partners in the GSCM implementation process. 	Korea

2.9 GSCM in Developing Countries

In 2013 World Bank used Gross National Income (GNI) per capita per year as standard to define developing countries. According to World Bank, developing countries are referred to those countries that GNI is US\$ 11,905 or less. Several researchers have done their research about GSCM in developing especially in China simultaneously other developing countries also initiated GSCM implementation in industries which extend GSCM related research to the developing countries. An intensive research has been done in developing countries to find the drivers of GSCM, different type of practices implemented in SMEs and their impact on performance outcome.

Huang et al. (2015), investigated the pressures and drivers that have been experienced Chinese SMEs in terms of GSCM, results of research indicated SMEs in China are facing pressures from different sources such as regulations, suppliers, customers to implement GSCM practices as result manufacturers were motivated to implement GSCM practices. Aganet al. (2013) explored the drivers of environmental process and their impact on performance of Turkish SMEs. Findings of the research indicated SMEs have more resources and better performance with their expansion. Furthermore, research revealed stringent laws caused inverse impact on SMEs performance comparing to large firms. Soubihia et al. (2015) carried out their research in Brazilian ISO 9001 certified company, it was found from the research green operational practices influence green performance. One research by Lee et al. (2014) in Malaysia tested the relationship between GSCM practices and

technological innovation in manufacturing firms, research showed green purchasing and cooperation with customer do not have any positive correlation with technological innovation but positive relation exists between GSCM practices and technological innovation. The research by Ninlawan et al. (2010) in Thailand showed environmental and positive economic performance are the significant outcome of GSCM while regulatory pressure is the most effective driver to implement GSCM in Thai electronics industries. Hence GSCM drivers, practices and performance are known simultaneously GSCM practices are being implemented in developing countries which provide opportunity to the academicians and researchers to conduct more research in developing countries.

Table 2.7: The summary GSCM in developing countries

Year	Title and Author	Finding and Conclusions	Country
2015	An exploratory survey of green supply chain management in Chinese manufacturing small and medium-sized enterprises pressures and drivers. Huang et al.	<ul style="list-style-type: none"> Chinese manufacturing SMEs face pressures from different sources including regulations, customers, suppliers and public awareness to implement GSCM practices. Chinese manufacturing SMEs are being motivated by different drivers to implement GSCM practices. 	China
2013	Drivers of environmental process and their impact on performance : a study of Turkish SMEs Agan et al.	<ul style="list-style-type: none"> SMEs have more resources and better environmental performance since they get larger. Because of stringent laws SMEs were disproportionately impacted comparing to large firms. In developing countries, either law is written loosely for SMEs therefore it is ineffective for environment protection or written strongly knowing that it will not be enforced. 	Turkey
2015	Green manufacturing: relationship between adoption of green operational practices and green performance of Brazilian ISO 9001 certified companies Soubihia et al.	<ul style="list-style-type: none"> Green operational practices influence the green performance 	Brazil
2014	Creating technological innovation via green supply chain management: An empirical analysis Lee et al.	<ul style="list-style-type: none"> Green purchasing and cooperation with customer do not have a significant positive correlation with technological innovation. Positive relationship exists between GSCM practices and technological innovation. 	Malaysia

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