

Considering on Green Supply Chain Management Drivers, as a Strategic Organizational Development Approach, Malaysian perspective

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Abstract: During to increasing flow of environmental degradation in recent decades, organizations have been forcing to pay more attention to their ecological footprint by changing their strategic viewpoints and adopting green initiatives in their production line. With increasing competition in today's global market, the firms have to look to the modern strategic manners, in order to gain sustainable organization and competitive advantage. Green Supply Chain Management as a new innovative managerial tool can be used as a strategic weapon to gain competitiveness and to promote the firms environmental and financial performance simultaneously. Meanwhile, drivers of adopting green initiatives and standards into the company's activities and processes are so much and includes a wide range of motives such as ,internal strategic motivations, external pressures of stakeholders and regulations, and the last but the most important ,is the companies' desire to gain the competitive advantages via having sustainable organization. The study includes all EMS ISO certified companies belong to any industry in Malaysia by sending them a questionnaire including the drivers of GSCM adoption, as well as type and nature of GSCM practices among the Malaysian EMS ISO certified firms. Also SPSS tools were implemented for the purpose of data analysis. The data which is collected in this research possess the properties of interval measurement, thus the appropriate indicator of association between the two variables is the Pearson Product moment correlation coefficient. The coefficient ranges between -1 and +1. And for the hypotheses testing the Multivariate Analysis and Multiple Regression Analysis were employed. As the result of this study it's concluded that all the four driving factors of adopting Green Supply Chain Management including Environmental regulations, External Stakeholders' pressures, EMS adoption, and Internal Strategic Motivations have the impact on adopting GSCM practices, which the most important predictor of GSCM were Internal Motivations and the less important one was External Stakeholders' Pressure.

Key words: supply chain management (SCM), Green supply chain management (GSCM), Sustainable development, Environmental Management System (EMS)

INTRODUCTION

Green Supply Chain Management(GSCM) is a kind of sustainable strategic development for enterprises in today's competitive workplace, which has emerged as a new innovative approach ,to achieve both financial and environmental benefits simultaneously, by reducing environmental risk and impact (Van Hoek 1999). With the more environmental concern during the past years the issue of environmental toxic waste incidental to industrial growth should be addressed together with supply chain management as the most important part in production chain, therefore contributing to initiatives of GSCM(Sheu, Chou *et al.* 2005). Researches shows, that the first step of GSCM implementation began from green purchasing. In 1994, Webb, L. investigated the effects of different parts of production chain, such as purchasing phase as a first step, on the environment .And he recommended, the purchasing part should choose suitable raw materials consistent with environmental standards. Simultaneously we should pay more attention to recycling part to optimize resource utilization in the supply chain. And it should be noted that in all phases of supply chain we should consider Green policies and standards. The main flow is as the following figure:

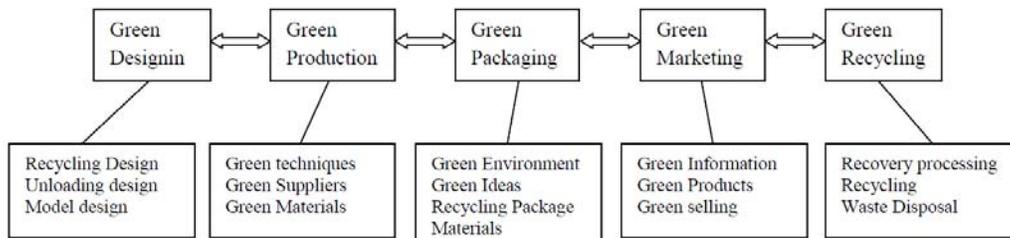


Fig. 1.1: The flow of Green Supply Chain Management (wen 2003; Baojuan 2009)

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The drivers of adopting green initiatives and standards into the company's activities and processes are so much and includes a wide range of motives such as ,internal strategic motivations, external pressures of stakeholders and regulations, and the last but the most important ,is the companies' desire to gain the competitive advantages via having sustainable organization. Porter and Vander Linde (1995) concluded that companies' response to competitive business environment and regulation forces, by expanding strategies to increase productivity of resources, making them possible to improve their industrial and environmental performance at the same time. In this way firms want to be sustainable by acquiring a sustainable supply chain (Sustainable Supply Chain Management).The sustainable firms display characteristic environmental behaviors on their supply chain, such as, pollution control, recycling or reverse logistics. Moreover they would be responsible for environmental accountability of their suppliers. Thus it needs to combine environmental liabilities to economic concern in order to help the future firm's sustainability by the means of delivering economic, social and environmental benefits simultaneously.

GSCM Contribution to Organizational Development:

The GSCM can be seen as an OD technology while the main goal of organizational development is to make organization healthier and more effective. Therefore the green practices and initiatives can be add along the company's internal and external supply chain as a innovative strategic technique, in order to promote the company's overall efficiency and health, in terms of organization social, environmental and economic performance. Another reason justifying that GSCM can be seen as an OD technique is that, it contains and shows some of important OD characteristics such as:

- Change : while GSCM is a sustainable strategic program and has specific objectives as increasing organization overall performance(social, environmental, financial)
- Collaborative: Indeed one of major requirements of adopting green practices is participating all organization members commitment, in a collaborative manner
- Performance: In fact the main goal of adopting such initiative programs is to improving organizational overall performance and quality
- Scientific: The term of GSCM can be defined based on scientific approaches to increase organization effectiveness in terms of its overall performance improvement

Supply Chain Management:

Different researchers have described supply chain management from different points of view and purposes. Sarkis (1999) definition of supply chain mentions that, the supply chain is a system that can be contains these parts purchasing, in-bound logistics, production, distribution (out bound logistics and marketing), and reverse logistics. One from the other definition(Handfield, Nichols *et al.* 1999) stated that, the supply chain can be included all activities related to the products flow and transformation. The flow starts from extraction of raw materials until the end users, as well as related information materials and downstream and upstream supply chain information .In this regard there a question can be arises, how to operationalise the definition of Supply Chain. To answer the above question Lambert (1998) specified some complementary components. The components are:

- 1) Supply chain process ,the activities through the supply chain that produce a special product for firms stakeholders
- 2) Supply chain components , managerial tools that integrate the business process over the supply chain
- 3) Supply chain structure ,that is the supply chain members network

The idea of SCM can be described by system theory(Chandra and Tumanyan 2005) . The system's common components are: input, output, process, mechanism, agent, function and the environment. Figure 2.1 shows the system components of the supply chain:

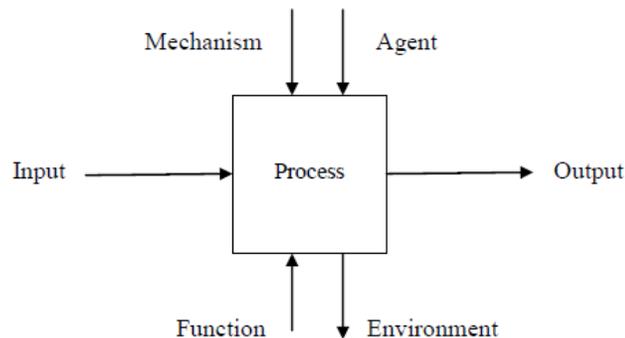


Fig. 2.1: The system component of supply chain (Chandra and Tumanyan 2005)

The system theory also can be viewed as a key condition and root of the environmental management (O’Riordan 1981). The system components and the three elements of Supply Chain can be combined and use as a guide to identify any of managerial practices, such as Green practices, in each part of supply chain. The table below shows each of the system components in a “green” supply chain.

Table 2.1: Supply chain and Green supply chain, system components(Chandra and Tumanyan 2005)

Components	Properties	Green supply chain in manufacturing
Input	Physical item, information or service that a “Process” needs to be started	Environmentally correct raw materials, supplier management
Output	Physical item, information or service that results from processing an input.	Reverse logistics and outbound logistics
Process	Flows, transformations and any steps which transforms input into an output	Internal Environmental Management System(EMS) adoption
Environment	the environment; physical or sociological; Which the component of system operate	Internal and external firm, drivers of adopting green initiatives
Agent	Computational, or human resources needs in the process (physical or logical object)	Green champions that boost initiatives .influential CEOs
Mechanism	Plans and workflow activities which facilitate the process	include the mapping of waste by products supplier assessment
Function	Mission, aim, purpose of the system	To accommodate a favorable output which has lower environmental trouble

1.3 Aspects of Sustainable Supply Chain:

In today’s competitive business environment the ultimate aim of any firm would be to gain competitive advantage. Companies can achieve this purpose if they can develop a sustainable organization .In this way the companies should contribute to sustainable development, that means they should consider financial, social, and environmental benefits or “triple bottom line -3BL”at the same time (Norman and MacDonald 2004). On the other hand while looking for profit, companies should be concern of protecting the environment. The sustainable firms show specific environmental behaviors on their supply chain, such as pollution control, recycling or reverse logistics. There is potential development of gaining competitive advantages using a sustainable SC(Hart, Arnold *et al.* 2000).

1.4 Supply Chain Management and the” triple bottom line – 3BL”:

The “triple bottom line” (3BL) idea backs to the mid 1990 when the managerial thinking leads using of this term in its work (Willard 2002). Companies such as AT&T, Shell, and British Telcom have implemented 3BL in their annual reports (Norman and MacDonald 2004). The 3BL theory’s idea is described as, extreme success or health of a company should not be measured only from traditional point of view by financial metrics (financial bottom line), i.e., it can be assesses by its social and environmental performance. In business now, there is another common theory with the same title as the 3BL that is Corporate Social Responsibility (CRS). CRS describes that a firm should be socially and ethically responsible to its stakeholders including employees, consumers, communities, governments, investors, supply chain members, unions, regulators, and even future generation (Maloni and Brown 2006). Carter and Jennings (2002) argued that, CRS is more comprehensive term than business ethics , it also covers dimensions such as community, workplace, philanthropy, safety, human rights, socially responsible, cause- related marketing, employment and manufacturing processes (Cowe 2004; Maloni and Brown 2006). Even though considering CSR have been slow in the supply chain (Murphy and Poist 2002), social responsibility concepts in the supply chain are increasing in importance. In 2004 Carter and Jennings established primary supply chain CSR classes of environment, diversity, human rights, philanthropy and safety. Other experts have also included areas such as labor practices, procurement and affirmative action purchasing.

1.5 Greening the Supply Chain:

Green Supply Chain Management (GSCM) is a newer concept rather than SCM. A few literature reviews are found on GSCM. Accordingly Green Supply Chain Management defines as, adding “greening phase” to the supply chain activities, in all parts which leads to a more “integrated “and “co-operative” supply chain that finally produces better competitive advantages (Rao 2002). As stated previously, GSCM requires ecological and

social aspects of business practices at the same time. Basics of greening as a “competitive initiatives” are described in detail by Porter and van der Linde (1995). They argued that, resource saving, waste eliminating, and productivity improving can be the basic reasons for green initiatives and all the three parts can promote the firms competitiveness. Accordingly “greening” can lower the ecological impacts of business and also increases efficiency, creates the potential source of competitive advantages in an innovative manner. Such competitiveness, mentioned earlier, may be based on:

- Building a positive brand images, using greening as a “unique” advantageous selling point for those environmentally conscious customers
- Leveraging innovation, innovative product design, in order to easier dis-assembling. This process has lower assembly time that is because of smart connectors of products
- Cost- saving(efficiency) perspectives, reducing the raw materials, resource usage per products, leading to cost saving. Using less fuel for instance by reducing tracking miles not only lowers energy and emissions usage but also saves on fuel expenses.

Based on the literature the “green” approaches can be categorized as value-seeking approaches. In order to develop “greening” approach as a base of gaining competitive advantages, different actions have been pointed including a group of practices for different players along the chain as well as performance measurement. The sample of these activities is shown in the table 2.2 below:

Table 2.2: Players, activities and performance metrics of greening efforts over the supply chain (Van Hoek 1999)

	Upstream	Midstream	Downstream
Performers	Suppliers of raw materials Part suppliers	Main suppliers Manufacturers	Wholesalers Importers/distributers
Green initiatives	Raw material choice Material recycling	New design of crumbs, Dis-assembly Transportation	Packaging Returns handling Returns shipment
Performance Metrics	Emission rates and energy efficiency per material %	volume of disassembled goods per hour, level of transport equipment usage	Extent of “air” in package volume for recycling

If a supply chain, assume to have liability over its ecological “footprint”, it is to be evaluated according to performance measurement by different related indexes. The footprint is described as, the size of land essential to meet a normal consumer’s need. Raw materials can be choose based on emission rate and the energy usage. Material re-use can be assessed by percentage of “virgin” or new material used in production part. Dis-assembly can be evaluated by volume of commodities used per time. Transportation can be accessed from the perspective of loading via the potential of transport equipment. Packaging can be evaluated according to packaging material used, and extent of air or idle space in the package. Return handling can be measured by volume covered in order to determine the amount of operation.

The GSCM pre-practices adoption:

In order to achieve a successful flow of greening in Supply chain, there are some pre-practice steps which need to be taking in to account. A key factor within GSCM is related with responsibility sharing inter organization. GSCM should advance the environmental responsibility sharing and provide new procedures to acquire a lower environmental effect origin by industry(Hervani, Helms *et al.* 2005). Several methods there are that managers can implement, in order to adjust the environmental effects within the supply chain, such as product stewardship, life cycle assessment, and design for environment (DEF) rules which are interrelated which each other. A fundamental approach to describe and assess the total environmental load connected with offering a service is life cycle assessment. It also combines a data inventory growth, product, process and materials impact as well as improvement analysis aspects. GSCM performance metrics and assessment are fundamental to all phases of life cycle assessment. One of the most frequently mentioned predictor of implementing GSCM is “the proactivity of the firm’s corporate environmental approach . Bowen (2001) discusses, a corporate proactive environment, a green strategic procurement and supply chain management

approach can develop suitable and correct capabilities for green supply chain management, i.e., supply chain management potentials and skills can facilitate green supply implementation and thus aid to develop environmental friendly practices over the industrial buying and selling complex network.

Sarkis and Kitazawa (2000) and Hart (1995) dispute, Total Quality Management competences can comfort the practices in pollution prevention programs. Furthermore cross-functional management capacities simplify product stewardship that is a crucial part for GSCM. Total Quality Management (TQM) makes decisions according to data and continues improvement through relevant and suitable performance measurement and metrics which is also appropriate for Total Quality Environmental Management (TQEM) concept(Hervani, Helms *et al.* 2005).

The GSCM, Drivers and Practices:

2.1 The GSCM Drivers:

Several studies on GSCM have determined a broad range of factors, persuading companies to develop environmental management initiatives and practices to its supply chain. It can be motivated by firm’s stakeholders’ requests, persuaded by firm’s want to have full compliance with environmental regulations, or even promoted by the firm’s internal strategic motivations, which is related to the opportunity to gain the competitive advantage in the market. According to review on the previous studies, the determining factors of GSCM adoption can be classified between:

- **“External Factors”** mostly related to “stakeholders pressures” and “environmental regulation “; which named as relational motives arise from the aspiration of a organization part, to become legitimized and to advance the existing relationship among the company’s different stakeholders;
- **“Internal Factors”** linked to a set of business-led strategic motives;

Neumayer and Perkins (2005) emphasize the same fact that , “broadly speaking there are two sources of drivers which induce firms to adopt these kind of initiatives and standards , and become certified in compliance with them; on the one hand internal motivation linked to efficiency (efficiency led) ,which is the advancement in performance, productivity, and profitability ;and on the other hand external or institutional drivers linked to social pressure poses by different groups and communities to convince company to adopt such practices”. In the empirical literature there is no agreement among experts that which are the most important basis of motives for green initiatives as seen in the following table:

Table 2.3: Motivations for Green Initiatives

Study	Country	Motives
Quazi <i>et al.</i> (2001)	Singapore	Real concern of senior management, possible cost savings, employee benefits, Environmental regulations, customer expectations, environmental trade barriers,
Fryxell and Szeto (2002)	Hong Kong	Main office environmental practices , and competitors’ goal Controlling regulatory compliance, environmental behavior improvement,
Poksinska <i>et al.</i> (2003)	Sweden	Customer expectation, cost reduction, external stakeholders pressure, help firm Good name and credit Internal strategic motives, external distribution and regulatory drivers
Pan (2003)	Taiwan, Hong Kong Japan, Korea	External forces, stakeholder pressure, marketing opportunities, avoid trade barriers, internal motives such as cost reduction, environmental performance
Yiridoe <i>et al.</i> (2003)	Canada	Good relation with communities, improve workers knowledge, corporate image Internal drivers: to increase efficiency of production, to encourage company’s Goodwill and image, External factor :to conformity with environmental regulation, pressure from stakeholders
Zutshi and Sohal (2004)	Australia , New Zealand	waste disposal high cost(cost saving), export barriers, to consistence with regulation, pressure from firm’s stakeholders, potential green marketing, Corporate image and good will, implementing Cleaner production process
Zeng <i>et al.</i> (2005)	China	Avoiding trade barriers to capture international market, to satisfy stakeholders requirement
Gonza’lez-Benito(2005)	Spain	Internal competitive motives(cost saving, efficiency in production), commercial Competitive drivers (Stakeholders, reputation, market), relational motives (regulation, communities)
Schylander and martinuzzi(2007)	Austria	To compliance with legal issues, standardization of environmental actions, to Promote the environmental performance, to improve reputation in society, Use of cost reduction potentials (internal strategic motive), to compliance with Regulation, innovation-led strategy (technology improvement, innovative Cleaner products, increase employee motivation, to get new customer
Gavronski <i>et al.</i> (2008)	Brazil	Reactive motives, internal strategic motives, regulation compliance motives, Proactive motives
Salomone (2008)	Italy	Stakeholders (communities, customers, public authority) pressure, competitive-led Reputation-led, innovation-led (green innovative cleaner product, productivity Improvement), efficiency-led (reduced production and resource usage cost)
Francesco Testa and Fabio Iraldo	Italy	Internal strategic motivations (reputation-led, positive corporate image: efficiency-led, leading to cost saving; innovation-led, clean products innovation) External motivations (external stakeholders’ pressure, regulatory pressure To improve company’s ecological footprint (environmental performance) leading To gain competitive performance

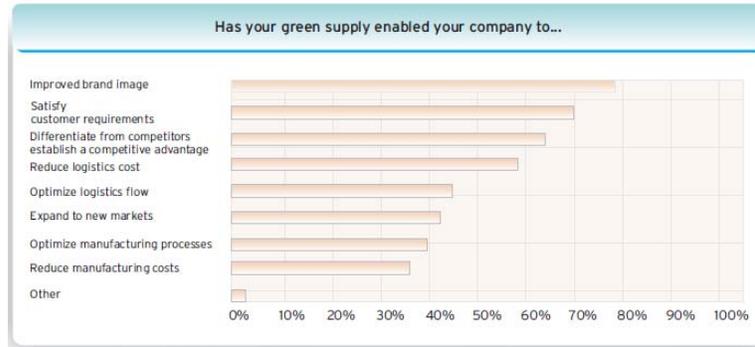


Fig. 2.2: Global survey of green supply chain 2008[Cognizant information provider]

As seen in previous figure, there is a great deal of available literature regarding the green initiatives' drivers. Accordingly, determinants of the GSCM adoption can be summarized as follow:

1. External motivations
 - Regulatory pressures : domestic, government, and international regulations
 - External stakeholders pressures : customers, suppliers, and community stakeholders
2. Internal strategic motivations
 - Corporate positive image , reputation-led
 - Cost saving strategy, efficiency-led
 - New innovative product and process development strategy, innovation-led
 - Environmental Management System adoption

Regulatory pressure:

Increasing environmental problems and natural resource scarcity have caused regulations at different, whether international or domestic levels to state more rigid regulations. At the same time public's environmental knowledge has improved through environmental education instruments. With these socio-political changes companies have adopted various environmental practices in different production stages, such as cleaner production, and ISO 14001 certification. With increases the international environmental regulation such as the Basel Treaty, the Montreal Agreement, the Waste Electrical and Electronic Equipment (WEEE), the Kyoto Protocol, Restriction of Hazardous Substance (RoHS), and Eco-design for Energy using Products (EuP), many of multinational companies are investing in research and development of innovative green Products (an innovative way of product development strategy) , appointing new standards and regulations bounding the use of hazardous materials (Chien and Shih 2007). With increased forces , larger companies are more dynamic in adopting environmental practices such as contributing to voluntary programs (e.g. Responsible care) (King and Lenox 2000) , which causing them to achieve better environmental performance.

According to researches of Hall (2000), Zhu and Sarkis (2006), Sarkis(1998) and others , environmental regulation is accounted to include , government environmental policies, domestic environmental regulations, and international environmental acceptances (Chien and Shih 2007).

- Domestic environmental regulations:

This group of regulations induces organizations to acquire appropriate relevant programs and strategies, in order to promote their ecological effects. Companies' environmental goals and domestic regulations are the two major sources of the forces. Moreover the main driver of company's green consciousness is increasing the impact of government set of laws.

- Government environmental policy

Increasing the environmental awareness of public sector, the legal necessities results from government regulations and policies and community stakeholders are usually considered to be the drivers that forces companies to adopt green initiatives and policies .Environmental set of laws aimed directly at emissions level that present the main aspect of cost-effective environmental strategy.

- International environmental agreements

Domestic environmental regulations seems to be a more powerful driver on adopting green policies, than the group of monetary policy linked with WEEE, but most of the governments and companies are being affected by global ecologic laws, such as the Climate Change Treaty, the Kyoto contract and the Montreal Protocol.

External Stakeholders Pressures:

Stakeholders' concepts penetrated to business management area, for the first time, as Freeman stated stakeholders approach, in 1994. Broadly spiking stakeholders including any individual or group community, who may influence or is influenced by the organization. External stakeholders who have effect on GSCM adoption include: suppliers, customers, communities, Non Governmental organizations (NGOs) and regulators (Hervani, Helms *et al.* 2005). Based on Hall (2000), Hervani (2005), Sadorsky and Henriques (1996) in addition to other specialists, the GSCM practices main external stakeholders are believed to include, customers, suppliers and community stakeholders.

- Customers:

Customers' ask for green products and services have now become the most significant driver for green initiatives (Doonan, Lanoie *et al.* 2005). But these customer calls are still evolving. As Chan and Lau (2001) conducted a comparison between green purchasing behavior of Chinese and American consumers. They investigated that, "translation of green purchasing intent into identical behavior is more effective among American consumers". In order to gain more long lasting solution, the environmentally sound product producers most meet and exceed the customers' need and requirement. Researches on U.S.A customers purchasing behavior demonstrates that approximately 75% of consumers affirm that the company's environmental good name affected their purchasing choices, and 80% of them have enthusiasm to pay extra for environmentally sound commodities (Lamming and Hampson 1996).

- Suppliers:

Suppliers support and participate in the whole supply chain performance, and a supplier "poor" performance can influence the overall supply chain performance (Sarkar and Mohapatra 2006).

Furthermore, manufacturer-supplier association, could be considered as a vital factor of acquiring a sustainable competitive advantage for companies (Sheth and Sharma 1997; Homburg 2001). Partnering with suppliers who consider their ecological footprint, now become a major criteria in most of the companies (Clark 1999). In this regard, some business leaders of developed countries have started to assess their second-tier suppliers (suppliers' suppliers) in addition to their major direct suppliers.

- Community stakeholders:

Community stakeholders are distinct as group of individuals who are not essentially include in the firm's group of partners, but they have familiarity with the community and company (Nelson, Rashid *et al.* 1999). As health impacts and sustainable solutions are to be recognized with confidence, it is necessary that community perceptions be sufficiently represented and that they affect decision-making process. Most of the experts have stated that, stakeholders' community has the potential power to affect and change the society's feelings of a firm.

Internal strategic motivations:

Several years of study on GSCM event has led to a general recognition of its benefits and aim. Now in the development stages, there is considerable scope, in order to increase our understanding of potential strategic motives for GSCM. Internal firm factors and strategies lead to GSCM adoption, are mostly linked to a special business-led strategic procedure, which they fluctuate based on the source of the "stimulus", that forces to adopting green initiatives through supply chain. Following part is the examples of internal drivers for green supply chain management practices:

The evolution of internal cooperation, in order to distinguish and achieve ecological improvement "both from the product life cycle input-side (e.g. procurement and collaboration with major suppliers) and output-side (e.g. implementation of recycling process). These practices are carrying out to follow cost-saving strategy, in order to increase efficiency. Supply chain environmental management is consequently adopted by firms as a response to external forces. Furthermore it can be a business strategic action, with the purpose of pursuing both environmental and economical performance simultaneously. Following a sustainable "environmental performance" can include different meaning and can be done in various manners. The three most cited strategic views which can induce firm to adopt such practices are following:

- Reputation-led strategic motives:

DiMaggio and Powell, 1983 in institutional theory describe that "companies adopt initiatives in order to achieve "legitimacy". Suchman (1995) defined that "legitimacy is a general perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions". Generally legitimacy can be defined as a kind of recognition within the people and society. Consequently adopting some certain practices and policies by organizations may improve the

organization's legitimacy. Accordingly adopting green initiatives and environmental sound practices such as , setting a collaborative green logistic network (in-bound and out-bound) , forcing suppliers to decrease their transportation emissions as well as making customers aware of this system, can contribute to create a positive corporate environmental image which can lead to increase their market share .It is noteworthy that lacking a good environmental positive image and social acceptance , the successful businesses may lose their market share on a international stage(Testa, Iraldo *et al.* 2009).

- Efficiency-Led Strategic Motives:

A strategic supply chain environmentally management can be developed with the purpose of reducing material usage per piece of product, or weight and width and amount of air of the packaging, in order to, reduce cost of production which leads to higher productivity in long term, and consequently giving the firms the opportunity to develop and provide a cost-based competitive product to the market(Simpson and Samson 2008).

According to what stated Roa(2006), and Min &Galle (2001), the Expected Business Benefits (EBB) (or expected financial benefits, specially from 3 "Re" ,reuse recycle, remanufacturing) , is one of the most significant issues inspiring GSCM adoption. Furthermore it is well-known that making revenue and financial profits are the most significant objectives of any organizations. Accordingly the economic benefits expected to be generated from Green practices in any stage and level of supply chain, specially from recycling part.

- Innovation-Led Strategic Motives

GSCM can be also seen as a result of an innovative and modern managers' strategy. The firms who are seeking for developing product in an innovative manner, both from technological and organizational point of view, can see , in the way of pioneeristic and uniqueness, the GSCM practices an opportunity to increase their market share and fortify their leadership comparing their competitors in the market. Moreover the innovation-led GSCM strategy is different from efficiency-led (cost-saving) ones, because of its point of view to supply chain environmental management strategy, which is more environmentally "specific".

Once a company begins to think about particular method, technology, or performance standards in its supply chain for the suppliers such as, chemical avoidance, the stage of knowledge and relational, investment begins to improve. Going forward from an "efficiency-led" strategy to a greater and higher level on "innovation-led" strategy in supply chain, and product design "required "particular ecological resources and knowledge (Lenox and King 2004). For products, the existing resource can be use to integrate modern environmentally sound design of products , such as particular product design, uniqueness, "functionality" or life cycle associated activities (e.g. service, repair, recycle).At the stage of process, they can develop environmentally sound methods and procedures for manufacture, "distribution", and product use(Simpson and Samson 2008).

- Environmental Management System (EMS) Adoption:

In the way of defining GSCM adoption drivers, it cannot be ignored that there might be some "complementary" parts which can affect a company's thoughts toward adopting such practices. Specially there is a common approach among researchers and adopters, that the supply chain management strategy, as well as "life-cycle" approach is an essential "complement" to environmental management system. Based on the relevant literature, a growing number of companies are putting into practice the Environmental Management System (EMS).This is an environmental based selecting process that has become so general(Testa, Iraldo *et al.* 2009).

An EMS is a systematic process that companies use, in order to achieve environmental objectives, policies and responsibilities as well as usual auditing of its all parts. EMS part existent in companies is the basis of motivations which leads to implement self-regulation method by companies such as ISO 14001 certification or EMAS. Based on review of relevant literature, in the early stage of EMS adoption (leads to ISO 14001 standards or EMAS registration) , firms mostly embark on "housekeeping" (i.e.: responsibilities to manage company's inside activities to be environmentally correct including, processes and operational commands, checking system and educating activities).

Recently companies becoming to think "out of the box", toward the whole production chain and whole life-cycle of their products, and consequently to their supply chain, to being environmentally correct. Based on experiences of EMS adapters , it could be conclude that the EMS tool can be efficient, both in managing a company's environmental issues and in a broad approach, it is effective specially in deal with environmental effects originated from different stage of supply chain. In recent decades some companies' EMS part began to center on their supply chain and relying on their environmentally correct suppliers, in order to improve their ecological performance and consequently their economic and competitive performance .For instance, IBM has established an EMS system to observe and analyze the amount of emission which produces in its production chain. This tool allows all business partners in supply chain to perceive how changes in all activities of supply chain, such as packaging transportation and inventory policy can have an effect on CO2 emission. By adopting this system company can analyze the relationship between emission reduction and other factors influencing company's success and competitiveness (such as on time delivery, solution for packaging and distribution cost

of production and, etc). In addition sharing these vital information with business up-ward and down-ward partners in the supply chain, and cooperation with them which are leading to gain higher productivity competitive advantage can improve the company’s both environmental and economic levels among the competitors. Thus, the collaboration between EMS and GSCM practices can be in a synergetic way and they are complementary for each other in order to organization environmental performance, because when applied to gather, they exhibit a more “comprehensive” vision for defining sustainable action among players of supply chain. So EMS is a key driver and “facilitator” for adopting GSCM practices (Testa, Iraldo *et al.* 2009).

GSCM Practices:

There are great deals of literature regarding the theory of environmental sustainability as a guideline for studying management practices in both operational and strategic perspective (Sarkis and Rasheed 1995; Klassen and McLaughlin 1996; King and Lenox 2001). In this regard other researchers have studied the greening supply chain within different area, such as product design (Allenby, 1993; Gupta, 1995), process design (Porter and Vander Lind, 1995; Klassen and McLaughlin, 1996), manufacturing practices (Winsemius and Guntram 1992), purchasing (Handfield, Walton *et al.* 2002) and a wide combination of these parts (Bowen, Cousins *et al.* 2002). “Adding the greening phase to supply chain engages addressing the effects and connection of supply chain to natural environment”. Followings are the classic processes and functions in any supply chain, which maintain the complete cycle of material flows. Each of these parts has deep impact on the environment:

- Purchasing and in- bound logistics: acquisition of raw materials from supplier, purchasing decision like vendor and supplier selection, material selection, outsourcing can have a deep impact on the environment
- Production: designing the product or process, controlling the quality , disassembly, remanufacturing, material recovery principals
- Distribution and out-bound logistics: this part’s functions meant to address the company-customer relationship issues such as marketing and also issues like packaging and inventory management
- Reverse logistics: integrate the return of materials, products and components back in to the” forward logistics” chain, include the 3 “Re’s” , reuse, remanufacture, recycle

Adding “Green” component to the supply chain:

As shown in table 2.4 GSCM practices are divided into four main scopes:

Internal environmental management, external environmental practices (Green purchasing), investment recovery, and eco design (Zhu and Sarkis 2004)

Table 2.4: Types of Green Supply Chain Management practices Based on Literature (Zhu and Sarkis 2004)

Internal environmental Management	Total quality environmental management Environmental conformity programs, ISO 14001 certification Environmental management systems
External GSCM practices	Providing suppliers design specification that include environmental necessities for acquired item Cooperation with suppliers for environmental objectives Suppliers requirement to develop and maintain EMS Suppliers requirement to have ISO 14001 certification Cooperation with customer for eco-design Cooperation with customers for cleaner production Cooperation with customers for green packaging
Investment recovery	Investment recovery (sale) of excess inventories/materials Recycling material internal of company Sale of scrap and used materials
Eco-Design	Design of products for reduced energy/material consumption Design of products for reuse, recycle, recovery of materials Design of products to avoid or reduce use of hazardous products and/or their manufacturing process

The present study takes a look to GSCM practices within these areas as follow:

- Green purchasing

Green purchasing is described as environmentally mindful purchasing which aim to guarantee purchased items are environmentally correct, such as reducing the cause of wastage resource decrease, replacement of material, supporting reuse, recycle (Carter and Ellram 1998; Min and Galle 2001; Zsidisin and Siferd 2001). Some of basic Green Purchasing actions are:

1. "Product content requirement": product green characteristic such as recyclable
2. "Product content labeling or disclosure": disclosure of the environment or safety characteristic of product
3. "Suppliers questionnaire": asking suppliers environmental activities
4. "Supplier environmental management system"
5. "Supplier certification"

GP mainly is linked with supplier environmental auditing, which is located at the beginning of the supply chain flow. Purchasing is therefore has a valuable position to play a main role in the greening of products and processes (Carter and Ellram 1998; Preuss 2001). The success of green purchasing is also rely on "whether the company has centralized or decentralized decision making" (Rao 2002), which establish the degree of "flexibility" in green purchasing process. This is happening because "decentralized" parts tend to cooperate with their own preferred suppliers. Among the difficulties of green purchasing implementation the main one seems to be financial reasons and concerns linked to the cost (Min and Galle 1997; Cox, Sarkis *et al.* 1999).

- Eco-design, Green product and process design (linked to in-bound logistics)

Eco-design is a structural process which includes the product and process major ecological characteristics and also the company's stakeholders demands of product design and development. ISO/TR 14062 is an international standard which offers directions in eco-design implementation. Design and development of products in a way which consider environmental performance associated to product and process, has many terms including, environmental or ecological design, environmentally consider design, environmentally responsible design, sustainable development of product, green product design, and life-cycle design. Based on the literature there are numerous different ways to state the eco-design concept. ISO/TR 14062 distinct (Drack, Wimmer *et al.* 2004) eco-design as an process which incorporate environmental concerns into product design and development. The incorporated course of actions, results in frequent "improvement" in ecological performance of the product in an innovative manner (ISO 2002). Fiksel (1996) stated that eco-design is a method, which contributed to new product development which considers "cost", "performance", "quality", and also environmental characteristics of product, by combining ecological terms in to product design activities. Karna (1998) distinct eco-design as a procedure which decreases the "ecological load of product" in its whole life cycle by taking into account the environmental characteristic of a product in the complete product development activities. Koeleian and Menerey (1993)define it as a organized process which is needed to design a product that is both economical and environmental sustainable. Other experts emphasized that physical life cycle of goods should be related to the goods development cycle. Wimmer *et al.* (2004) suggested an eco-design theory, which is considered as one of the most useful eco-design techniques. It is according to a statement that eco-design meant to improve the ecological performance of an accessible good. According to following figure eco-design is accounted one of the some steps in a product development cycle, with the purpose of reducing environmental impacts of product, and stated that eco-design cannot be alone, it is only one piece of the product design and development procedure.

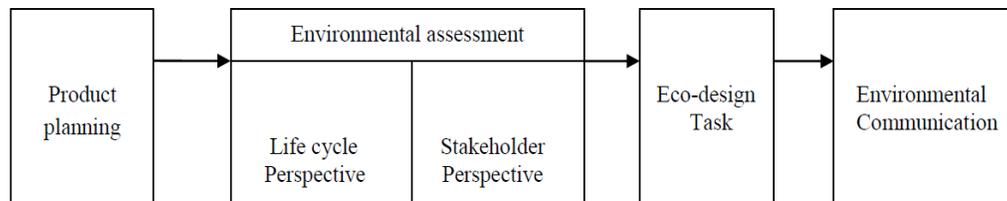


Fig. 2.4: Eco-design Approach (Drack, Wimmer *et al.* 2004)

- Reverse logistics (Out-bound logistics)

Reverse logistics is an approach, which is concern in practices linked with the 3 "Re's", recycling, reusing, reducing the amount of raw materials uses in production phase (Carter and Ellram 1998). Among some groups of products the recycling processes have been applied. This refers to Cars, Chemicals, Computers, Printers, Batteries, White goods, Packaging and etc. Within the other parts the expansion is just starting. Reverse logistics process will be a key issue in future, not only for companies which are going to apply the recycling method, but for those that have to pay for "disposal" of "run-down" or waste products. Reverse logistics begin in the

product development stage, where the vital point is to consider the content of raw material uses in production part, in order to reduce the uses of resources and the cost associated with later recycling of pieces. In the practical level the reversed flow can have various types, “from gathering in to return shipments in to distribution channel pursued by dis-assembly and re-use of chosen elements”. Instead, used parts could be “shredded” and “scrapped” and again enter into production phase as raw materials. Returned pieces of goods could be reverted to suppliers and supply chain participants and companies, in order to remanufacture of these parts and enter them again in supply flow. Furthermore dis-assembly activities in the reversed flow may entitle for “proactive design for dis-assembly” exactly in the early product design stage of both supplier and customer (Carter and Ellram 1998).

- Investment recovery

One of the main factors associated to sustainable businesses is “asset disposition” or investment recovery. Investment recovery is put into practice “recouping” the asset value as long as the company’s need, by reusing and recycling or selling extra properties. Corporation in every industry should have investment recovery division, depending on industry type, asset groups can be equipment and machinery, manufacturing, “by-products and wastes”, building and land. The effectiveness of investment recovery as a new practice is contributed to sustainability concept, and investment recovery programs play a important role in sustainable strategic businesses. Economic point of view, investment recovery players aims to “maximize” the company’s return on “surplus asset” through sales of them. “Value generation” consists of “redeployment”, inventory decrease and saving related costs such as “storage costs”, “maintenance costs” and taxes. Environmental perspective: “surplus asset” which can be “redeployed” within the firm or sold on the outside, avoids the “disposition” of these assets to scrap yards or landfills. The asset selling via online “disposition avenues” such as online auction, more decrease in ecological effects by “eliminating” the logistics of transporting the equipment to a “central staging area”, also suggesting online viewing potentials.

GSCM Performance:

The results and benefits associated with adopting GSCM practices have been investigated in the academic literature. From the theoretical perspective, previous studies have identified the relationship between GSCM practices and organizational performances consist of, environmental, economic and operational performance and according them competitive performance. Numerous researches explored that GSCM practices can “improve” environmental performance (Florida 1996; Zhu and Sarkis 2004). Geffen and Rothenberg (2000) recommended that collaborative relation with suppliers help the adoption and growth of environmental initiative practices. Moreover cooperation between supplier and customer, partnership programs and common Research and Development result in improving environmental performance.

Financial performance is generally the most important driving factor for those enterprises who implement such innovative environmental practices. Whether GSCM practices results in positive or negative financial performance is still varied (Wagner, Schaltegger *et al.* 2001). Alvarez *et al.*, (2001) stated that environmental management practices such as GSCM positively affect the organization’s economic performance. Dodgson (2000), Dyer and Singh (1998), Von Hippel(1998) and other experts disputed that “inter-firm relations offer formal and informal system which encourage trust, decrease risk, and in turn, boost innovation and productivity and “sales performance”. There are limited studies which pointed out the positive connection of environmental practices and operational performance. Szwilski (2000) stated that “environmental management practices are strategic innovative programs and tools for industry to encourage company’s operational performance.

The organizational factors associated with GSCM success:

The present study has a quick review on related literature of success factors of GSCM. Zutshi and Sohal (2004) proposed that the vital “success factors” for Environmental Management System adoption contain, senior managers’ support, education and preparation, internal evaluation and “sustainability”. Gonzalez Benito (2006) stated that crucial factors of such innovative practices consist of company characteristic (company size and existing resource, extent of “internationalization”, situation in the “value chain”, management approach and incentives), stakeholders pressures (internal and external). Based on review of relevant literature the most important organizational factors associated with the GSCM success are as follow:

- “Corporate environmental commitment”

The two main components of “environmental commitment” are corporate environmental strategy (Jabbour and Santos 2006) and senior managers’ support (Daily and Huang 2001; Zutshi and Sohal 2004). Jabbour and Santos (2006) disputed that “environmental policy” is a kind of “organizational declaration” as well as the description of its environmental goals and its procedure of activities. Daily and Huang (2001) stated that senior managers “support” can affect the “success” of green practices by “human resource management actions”, such as compensations, education, and improved communication.

- “Environmental benchmarking”

Benchmarking is a “market-based” educating procedure, adopting by companies those who are looking for finding best practices which results in greater outcomes, that leads to gain competitive advantages. Vorhies and Morgan (2005) disputed that the main step of benchmarking has moved from the “content” of product or service, the strategies followed, and performance measurement to technique importance, concentrating alternatively on the abilities required to create the superior outcomes (Huang and Wu 2010).

- Research and Development “strength”

Research and Development power is associated with an organization’s potentials and resources, to develop a new technology. Li and Calantone also stated that the R&D “strength” of a company plays an important role in developing new innovative products. Some studies pointed out that the R&D strength can have positive effect on future economic performance (Huang and Wu 2010).

- “Cross-functional integration”

Developing new products is a multifaceted procedure engaging individuals with various backgrounds and management position. Broadly speaking, the product success relies on the efficient communication and cooperation among the different team members. Toroy *et al.*, (2008) stated that “cross-functional integration” impacts directly product and process development success. Cordano and Frieze (2000), and Russo and Harrison (2005) stated that the efficiency of green initiatives regularly involves collaborative relationship network among Environment Management System players, engineers and production employees (Huang and Wu 2010).

Implementing barriers associated with GSCM practices:

As stated previously some organizational factors influence a firm attitude toward adopting such innovative practices, which can lead to successfully implementing of them. Based on review of relevant literature, there are other factors which may cause difficulties on adopting these kinds of innovative practices.

Angel del Brio and Junquera (2003) disputed that “ a lack of small and medium sized organizations innovation, in an environmentally strategic manner might be a result of numerous factors such as lower economic resources , the model of “organizational structure” , low power of the strategic implementation skill against changes in the organization , lack of environmental knowledge and education in management level, lack of environmental consciousness, education and commitment in employees level , the low importance of environmental issues in company, poor competence to achieve innovations and their lack of connection with external stakeholders. These short comes, also need to be addressed in large companies.

Methodology:

According to the literature review the main determinant factors that are independent variables, which are contributed to adopting Green Supply Chain Management (GSCM) which is dependent variable can be summarized in the following factors:

- Environmental Regulations
- External stakeholders pressures
- Environmental Management System
- Internal Motivations

The relationship between independent and dependent variables, in the present study, is illustrated in a diagram as it is depicted in Figure 3.1.

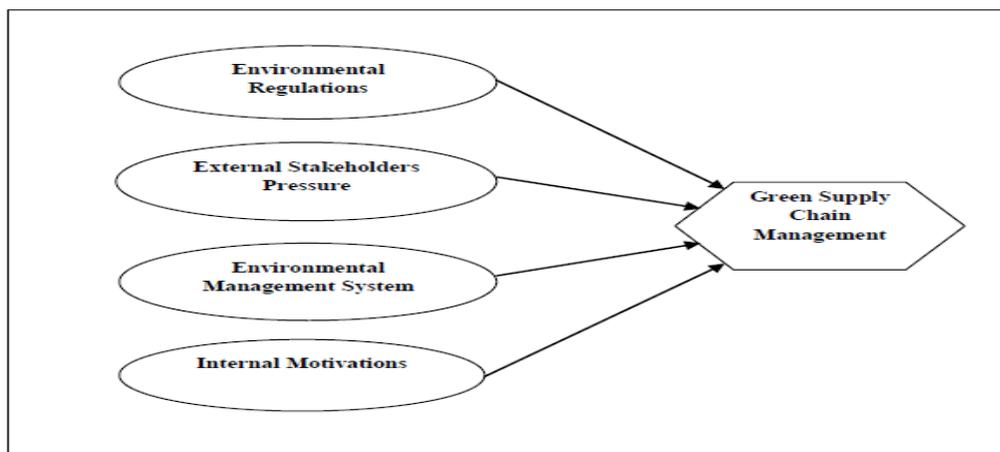


Fig. 3.1: Theoretical framework for present study

As the present study is place to realize and spot the determinant drivers of Green Supply Chain Management adoption among Malaysian EMS ISO certified companies and the study doesn't have a clear view about this area, thus exploratory study is suitable for the idea of the study. The population includes all EMS ISO certified companies which belong to any of industries in Malaysia. In the present study the simple random method of probability sampling has chosen. The study chose the EMS ISO certified companies in any of industries in Malaysia, since they were expected to emphasize green initiatives. The unit of analysis is individual firms, and the sample frame represents all EMS ISO certified firms in Malaysia. The major databases include the data that was collected from SIRIM organization and FMM directory 2010 of Malaysian manufacturers. These sources provide a comprehensive database of EMS ISO certified Malaysian firms that are 526 firms. Accordingly, the population size of this study is 526 EMS ISO certified firms. A number of 200 firms were included in the present study, and the research made physical and electronic mail survey as well as face-to-face interview with these companies. The proper sample size would be 75 companies as the study has four independent variables.

- **Survey Questionnaire Development:**

In order to identify the drivers of GSCM practices among Malaysian enterprises and to evaluate the research hypothesis, researcher develops a questionnaire (see appendix 1) including the drivers of GSCM adoption, as well as type and nature of GSCM practices among the Malaysian EMS ISO certified firms. The questionnaire consists of two parts with totally 33 questions. The first part contains general company information such as type of industry, number of employees and suppliers, participation in green association and any kind of ISO certification. The second part of questionnaire covers the four main drivers, which are based on the literature review, the environmental regulations, the external stakeholders' pressures, the EMS adoption and internal motivations. This part of questionnaire consists of 17 questions, were answered using five-point Likert scale from, not at all(1), consider a little (2), consider(3), make much account(4), most important (5). And the 11 questions regarding the type of GSCM practices such as green purchasing, total quality environmental management, eco-design and investment recovery also was measured using five-point scale from, no consideration(1), a little consideration(2), moderate(3), practicing(4), actively practicing(5).

- **Pilot Testing:**

"A pilot test is conducted to detect weaknesses in design and instrumentation and to provide proxy data for selection of a probability sample. It should therefore draw subjects from the target population and simulate the procedures and protocols that have been designated for data collection" (Cooper, Schindler *et al.* 2003) .

At first, the primary outline of the questionnaire was piloted on a small size of 30 firms. The reason is to get better design of questionnaire in terms of sequence of questions, wording, validity and reliability that facilitate the answering process for respondents. The questionnaire was then reorganized based on the feedback received from the respondents.

- **Data Analysis Method:**

In this study, the SPSS tools were implemented for the purpose of data analysis. The data which is collected in this research possess the properties of interval measurement, thus the appropriate indicator of association between the two variables is the Pearson Product moment correlation coefficient. The coefficient ranges between -1 and +1. And for the hypotheses testing the Multivariate Analysis and Multiple Regression Analysis were employed.

RESULTS AND DISCUSSION

5.1 Data Analysis:

Based on the research methodology described earlier, the results obtained from respondent firms were thoroughly analyzed. The output of the results is clearly explained here.

- **The Respondent Enterprises Demographic Details:**

Table 4.1 presents the distribution of respondent enterprises in terms of industry and size, the numbers of employee. Notice that, the respondents are mainly from four typical industries, chemical, food and beverage, electronic and electrical, and automotive. Enterprise size is ranged from under 300 to over 2000 employees. About half of the companies are placed in company classification of between 300 and 2000.

Table 4.1: Distribution of survey respondent enterprises by industry and size

Industry	Total	Percentage (%)
Automotive and automobile components	9	15
Chemical, oil, palm	12	20
Electrical and electronic	11	18.3
Food & beverage	10	16.6
Plastic	4	6.6
Pharmaceutical	3	5
Others	11	18.3
Size (employees)		
>2000	20	
300-2000	26	
<300	14	

In this study, first Person Product Moment correlation was used to test the relationship between the predictor variables and dependent variable. In the second step, Multiple Linear Regression was employed to determine the contribution of each independent variable toward prediction of dependent variable. The results of the analyses are presented in the following subsections.

Correlation analysis:

Person correlation analysis was carried out to test the relationship between the independent variables (external regulations, stakeholders’ pressure, EMS adoption, and internal strategic motivations) and dependent variables (GSCM adoption). Gildford’s rule of thumb was used to interpret the degree, size, strength or magnitude of relationships.

Table 4.7: Correlation between independent variables and GSCM adoption

Variables	r	P(2-tailed)
Environmental regulations	.580	.000**
External Stakeholders’ pressure	.578	.000**
EMS adoption	.597	.000**
Internal strategic motivations	.689	.000**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The findings as depicted in Table 4.7 showed that, there was positive and significant relationship between environmental regulations and GSCM adoption (r=.580, p=.000). The finding also indicated that there are positive and significant relationship between external stakeholders’ pressure(r=.578, p=.000), environmental management system (EMS) adoption (r=.597, p=.000), and internal strategic motivations(r=.689, p=.000) with GSCM adoption as dependent variable. According to Guilford rule of thumb, in this study, the correlation between all dependent and independent variables can be categorized in moderate level.

Regression Aanalysis:

As aforementioned, achieving the objectives of this study and determining the contribution of each independent variable toward prediction of GSCM adoption, besides correlation analysis, multiple linear regressions was also employed. The ‘Enter’ method of multiple regression analysis was performed to explain the variation in the GSCM adoption, based on four predictor variable. The four predictors of the proposed model were environmental regulations (X1), external stakeholders’ pressure (X2), environmental management system (EMS) adoption (X3), and internal strategic motivations (X4). The general equation of the proposed regression model takes the form (Equation 1):

$$Y_1 = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + \varepsilon \tag{1}$$

Where:

Y₁ = GSCM adoption

X₁ = environmental regulations

X₂ = external stakeholders’ pressure

X₃=environmental management system (EMS) adoption

X₄= internal strategic motivations

b₀ = constant (intercept)

b_{1,2,3,4} = slopes (estimates of coefficients)

ε = model error of estimate

Residual Analysis:

In using the regression analysis prior to explain the variation of dependent variable based on the predictor variables the required assumptions have to be met and supported. The main assumptions include; normality of residuals, linearity of residuals, and issue of Multicollinearity. The residuals are differences between the observed and the predicted values (obtained from the regression equation).

Normality of Residuals:

The results based on Kolmogorov-Smirnov and Shapiro-Wilk tests of residuals shows, that the data were normally distributed for the all variables in the analyses as tabulated in Table 4.8. The result shows that, both kolmogorov and Shapiro **Sig** values (**0.2** and **0.721**) are more than 0.05, which means the distribution has no significant departure from normality.

Table 4.8: The Result of the Normality of Residuals Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual	.085	60	.200 [*]	.986	60	.721

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Furthermore the Normal P-P Plot of regression standardized residual was used to check whether the residuals were normally distributed. According to rule of thumb, if the residuals form a normal distribution, the residual line closely follows the diagonal (Hair, Black *et al.*). Figure 4.1 showed that most of the values for this study fall along this line, thus, it can be said that, the residuals of data for this study are normally distributed. Then the assumption of residual normality was met in regression analysis for this study.

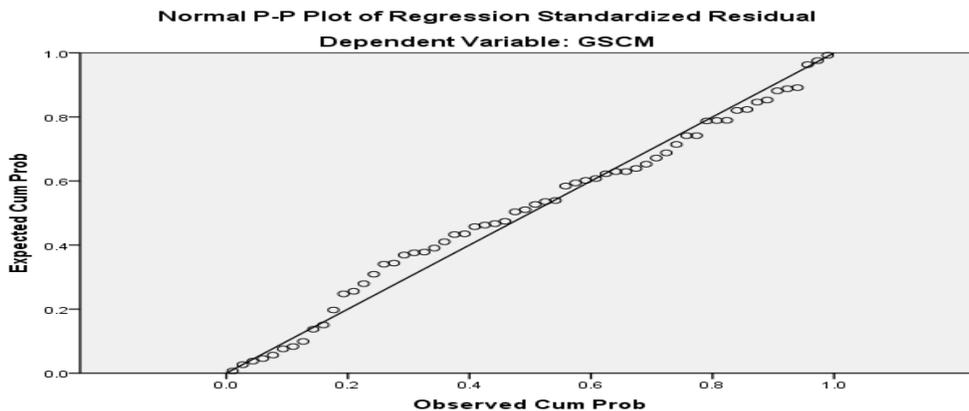


Fig. 4.1: Normal P.P. plot of regression standardized residual

- **Linearity and Independency of Residuals:** In order to check the linearity and equality of variances the Scatterplot of standardized predicted values vs. observed values (dependent variable) also was used. If the model fits each data value exactly, the observed and predicted values coincide on a straight line where more variation is expected in the midrange than at the tail (Hair, *et al.*, 2006). All the standardized residual values are within +3,-3, the dots are scattered randomly and there is no non-linear or quadratic pattern. As a result, the residuals can be assumed to be **independent** and the model seems to be acceptable. As Figure 4.2 shows, the assumption of **linearity** also supported for regression analysis in this study.

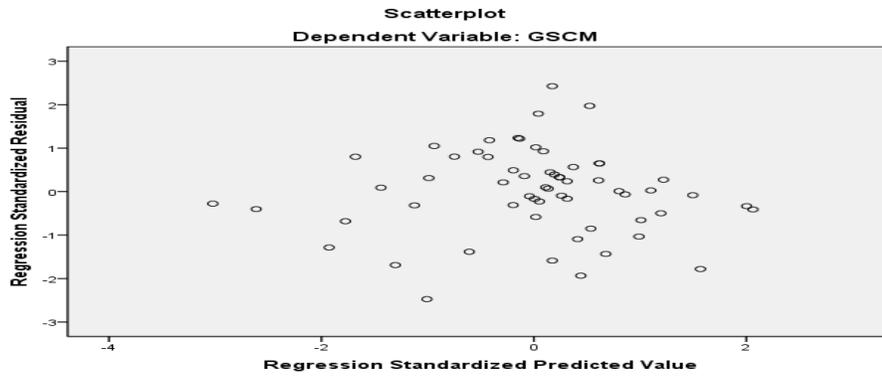


Fig. 4.2: Scatter plot of regression standardized residual values

Multicollinearity:

Multicollinearity is a problem with a correlation matrix that occurs when the correlation among the independent variables is too high (generally .90) (Hair, Black *et al.*). There are several ways to examine the Multicollinearity problem in data such as Correlation matrix, Tolerance, and Inflation Factor (VIF).

Based on the correlation matrix, the correlation between the independent variables is about .90 or greater, which is potential for a Multicollinearity problem. As it can be seen in Table 4.9, for this study, Multicollinearity problems did not exist because the relationship between all independent variables is less than .90.

Table 4.9: Correlation matrix of independent variables

Independent Variables	X1	X2	X3	X4
Environmental regulations (X1)	-			
External stakeholders' pressure (X2)	.387	-		
EMS adoption(X3)	.372	.567	-	
Internal strategic motivations(X4)	.374	.653	.514	-

Another way to identify the problem of Multicollinearity is the value of Tolerance. Tolerance refers to the amount of variability of an independent variable not explained by other independent variables. As a rule of thumb, a smaller tolerance value indicates high multicollinearity, the cut-off threshold for the tolerance value is equal to or < .19. The findings of this study indicated that the tolerance value for independent variables in this study is greater than .19; thus, the Multicollinearity problem was not valid in this data (Table 4.10).

Results from ANOVA Table:

The result of the assessment of the ANOVA table showed that the model fits the data ($F(4, 55) = 24.529, P = .000$). This means that the slope of the linear regression model line, estimated, was not equal to zero. The Multiple correlation coefficient (R) was equal to .80, which shows a high relationship between these predictor variables and GSCM practices as the outcome variable. Furthermore, the findings show that these four predictor variables explained 64.1% ($R^2 = .641$) of the variations in GSCM practices.

Based on the **results of regression analysis** shown in Table 4.10, the proposed prediction equation for this study is:

$$Y_1 = .874 + .234X_1 + .035X_2 + .203X_3 + .378X_4 \tag{2}$$

Where:

Y_1 = GSCM adoption

X_1 = environmental regulations

X_2 = external stakeholders' pressure

X_3 = environmental management system (EMS) adoption

X_4 = internal strategic motivations

Table 4.10: Multiple Regression Analysis of GSCM adoption

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.874	.367		2.385	.021		
Environmental regulation (X1)	.234	.067	.317	3.508	.001	.801	1.248
External stakeholders' pressure (X2)	.035	.081	.050	.432	.668	.492	2.032
EMS adoption (X3)	.203	.088	.236	2.304	.025	.624	1.603
Internal strategic motivations (X4)	.378	.100	.417	3.774	.000	.534	1.873

R=.80 R²=.641 Adjusted R²=.615

5.2 Hypothesis Interpretation and Inferences:

According to the finding of the present research, in the following section, four hypotheses will be discussed and answered. The four specific objectives (objectives 2 to 5) of the study were to find out the effects of independent variables including environmental regulation, external stakeholders' pressure, environmental management system (EMS) adoption, and internal strategic motivations on adopting GSCM practices. Thus it is hypothesized that:

H1: Environmental regulations don't have a significant impact on adopting Green Supply Chain management practices

Based on correlation analysis, as depicted in the Table 4.7, the study was found a significant connection between environmental regulation and GSCM practices adoption. Furthermore, the result of regression analysis shows that environmental regulation, predictor variable, has a significant contribution toward prediction of GSCM practices adoption (B= .317, p= .001). Therefore the first research hypothesis of this study was supported, which means the environmental regulation has significantly affected GSCM practices adoption.

H2: External stakeholders' pressure does not significantly affected Green Supply Chain Management adoption

Once according to the result of correlation analysis, the study was found a connection between external stakeholders' pressure and GSCM practices adoption (Table 4.7). However, according to the results of multiple regression analyses as showed in Table 4.2, external stakeholders' pressure had no significant contribution toward the prediction of GSCM practices (B= .050, p= .668). Thus, based on the multiple regression analyses the second hypothesis of this study was not supported. Accordingly it can be concluded that, the external stakeholders' pressure does not have significant impact on adopting Green Supply Chain Management practices.

H3: Environmental Management System doesn't significantly affected Green Supply Chain Management adoption

The result of person correlation analyses as shown in Table 4.7 indicated that the relationship between environmental management system (EMS) adoption and GSCM practices adoption is significant. In addition the result of regression analysis showed a significant contribution of environmental management system (EMS) adoption toward explain the variation of GSCM practice (B= .236, p= .025). Thus there is a significant relationship between Environmental Management System and GSCM adoption.

H4: Internal strategic motivations don't significantly affected Green Supply Chain Management adoption

The correlation analysis shows that the relationship between the internal strategic motivations and adopting the GSCM practices is considerable. Also, the multiple regression analysis shows that, based on the standardized regression coefficient the internal strategic motivations have the highest significant contribution to explain the variation in the GSCM practices (B= .417, p= .000). Thus the results show that the internal motivations, in this study are the most significant predictor of adopting GSCM practices.

Comparing the Research Findings:

Comparing the results from the study's finding with some of literature (Zhu, Sarkis *et al.* 2005) shows similarities and differences. The study took major similar pressure based on the literature including central and regional environmental regulations reducing cost of resources and material used and improve brand image (as the strategic motivations), the company's environmental missions and management system, and the company's stakeholders' pressures. Based on what stated Zhu and Sarkis in 2005, a comparative analysis shows that the major driver of adopting GSCM initiatives in Chinese enterprises is concerning with environmental regulations

and the major factor among the US enterprises are to reducing cost of resource usage and increasing the brand green image (as the Internal strategic motives). According to findings of the present study, the major driver of adopting Green Supply Chain Management practices in Malaysian enterprises is Internal Strategic Motivations of firm, which is more similar to findings in US enterprises. The results show that, the Malaysian firms have recognized the importance of GSCM practices adoption, but have lagged in the implementation of its practices. It is not clear what are the major barriers of the implementation, but the lack of appropriate instruments such as managers' skills and awareness, employees' knowledge and commitment to such programs, lack of companies' abilities of doing cross-functional activities and processes may all be the barriers.

Recommendations:

The survey analysis provided some insight which fundamental improvement can be done. The results show that the Malaysian firms are aware of adopting such strategic practices, but they might be in the early learning stage of such organization environmental programs and practices. And still there is a gap between awareness and adoption of such strategic practices. Based on the study's findings, which show that External Stakeholders' Pressures has lowest impact on adopting Green Supply Chain Management practices in Malaysian enterprises, there is a need for them to become better educated in developing co-operative relationship with their suppliers, customers, and community of stakeholders for the common environmental objectives. As well as learning more on doing cross-functional activities with other players along their supply chain. This study is one of the efforts to determine the drivers of GSCM adoption among Malaysian enterprises and our investigations are exploratory and future studies can also include investigation of longitudinal relationship identified in this research. As an initial exploratory research we have limited number of companies included in the study and a larger survey with a larger set of companies is needed. In addition there is a need to investigate the further pressures which may exist and also the effects of GSCM practices on organization economic, environmental and operational performance as well as the relationship between each driver on the organizational performance. Furthermore the various relationships, such as mediating and moderating relationship that may live among the different factors should be investigated.

Implications:

In order to persuade GSCM practices adoption, Malaysians government has made some regional and domestic laws as well as concepts such as Extended Producer Responsibility. But still more efforts by government and businesses are needed to promote GSCM implementation. An implication of the present study for Malaysian enterprises is to persuade them for adopting such green practices, in order to increase their market share in developed countries as a target market of their green products and it's because of their requirements of being environmentally correct. With globalization, Malaysian firms program more to export their products to developed countries. Under this situation that developed countries have made fixed import regulation, subject to avoid of importing product without any environmental certification such as ISO 14001. It is necessary for Malaysian firms to meet the expectation of society about environmental issues, in order to increase their market share by exporting their green products to international market, and to promote their green brand image, specially for those first movers in the market. When a "front-runner" company wants to go beyond the boundaries, in order to create valuable innovations, or build a stronger brand image for its products, in these conditions the firm needs to rely on the co-operative relationships opportunities offering by its supply chain such as GSCM as an innovative strategic philosophy.

Conclusion:

With increasing competition in today's global market, the firms have to look to the modern strategic manners, in order to gain sustainable organization and competitive advantage. Green Supply Chain Management as a new innovative managerial tool can be used as a strategic weapon to gain competitiveness and to promote the firms environmental and financial performance simultaneously. As the result of this study it's concluded that all the four driving factors of adopting Green Supply Chain Management including Environmental regulations, External Stakeholders' pressures, EMS adoption, and Internal Strategic Motivations have the impact on adopting GSCM practices, which the most important predictor of GSCM were Internal Motivations and the less important one was External Stakeholders' Pressure.

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