

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of the past literature in the fields of GSCM practices. The first part of the chapter discusses the concept of supply chain management and its overview. Following this, the chapter will explore the evaluation of supply chain management (SCM) to green supply chain management (GSCM). Then, the chapter will review and explore all previous studies related to green supply chain management practices. This chapter reviews the literature related to the GSCM implementation of Malaysian manufacturing companies. Besides, this chapter reviews the antecedents' studies related to the direct relationship between the variables in the current study. The first relationship will discuss is between GSCM practices and a firm's competitive advantage as well as between GSCM practices and innovation capabilities. Furthermore, the chapter discusses the literature on innovation capabilities and its role in mediating the relationship between GSCM practices and a firm's competitive advantage. Finally, the chapter presents the conceptual framework of this study and discusses the underpinning theory.

2.2 Overview of Supply Chain Management

2.2.1 The Conception

Supply Chain is the heart of the firm's operations which make the best decisions where managers need to access real-time data about their supply chain (Mehrizi, 2014). According to Ellram and Cooper (1990), define supply chain as "an integrative philosophy to manage the total flow of a distribution channel from supplier to the

ultimate user". Another definition by Christopher (1999), defines a supply chain as a network of the firms that have been involved in the upstream and downstream linkages in various activities and processes that produce value in the form of products and services that will be delivered to the end-users. In other words, the supply chain consists of diverse companies with both upstream that is suppliers and downstream which is the distribution to meet the demand of the consumers. Monczka et al. (2009), define a supply chain as a set of three or more firms that are linked by one or more upstream or downstream flow of services, products information and finance from a source to the consumer.

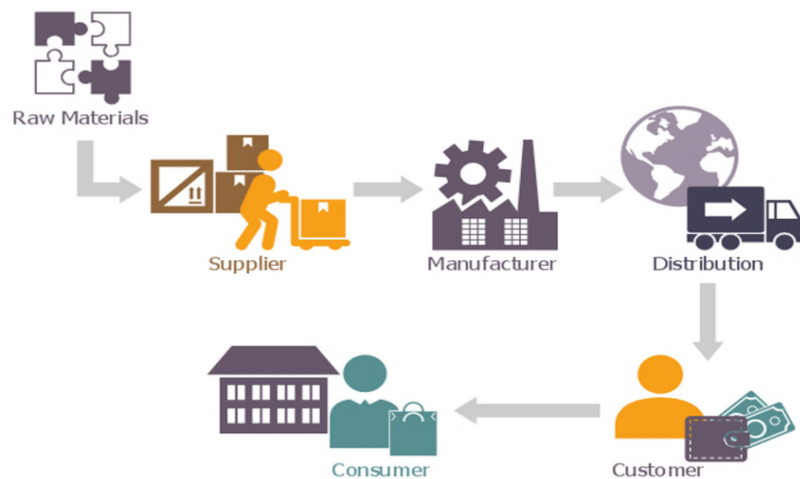
Many scholars define supply chain management in different ways and methods but all will lead to the same goal and aim. However, the term of SCM is introduced originally in the early 1950s by management consultants Oliver and Webber (1982), and other definitions have been reviewed and developed over the last three decades. According to Monczka et al. (2009), explained SCM is the involvement proactively managing both ways in and out activities and coordinating the entire process of material which require joint relationship among suppliers at a different level. Based on various definitions, supply chain management requires the coordination of activities and flows that extend across boundaries. Londe and Masters (1994), also, define a supply chain as a strategy consisting of a long-term understanding of a long-term agreement and not a legally binding contract between two or more firms to develop trust and commitment to the relationship. This activity involves firms that include buyers and sellers as well as carriers, warehouses and other third parties.

2.2.2 The Elements of Supply Chain Management

Furthermore, the supply chain is a network in a corporation where the term supply chain management is generally known as the whole integration of all the activities of making products from bringing the raw materials and transformation these materials to intermediate products and final goods before delivering them to the end consumers (Menon & Shah, 2019). In other words, the elements of the supply chain is a network in a firm that has been used to deliver the final produced and manufactured products or services to the final user with an SCM that involve many activities from sourcing the raw materials, engineering process flow including design, production, planning, monitoring and control the activities in the supply chain with the objective of build-up net value, competitive infrastructure design, handling logistics, coinciding supply with demand and performance assessment (Feng et al., 2019). In other words, SCM concentrates on providing the right product to the right customers at the best cost, right quality, right time, right form and right quantity.

2.2.3 The Process of Supply Chain Management

The flow of material and information in the process of the supply chain which a typical supply chain is a network of supplying the raw materials to the manufacturer to produce a product or service, after making the end product then it's time for the stage of logistics to distribute the product to the middlemen and retailers which they have a connection to the customers that enable them to sell the end product or service to the end-user to consume to satisfy their needs which will turn a profit to the organization (Menon & Shah, 2019).



Source: Menon and Shah (2019)

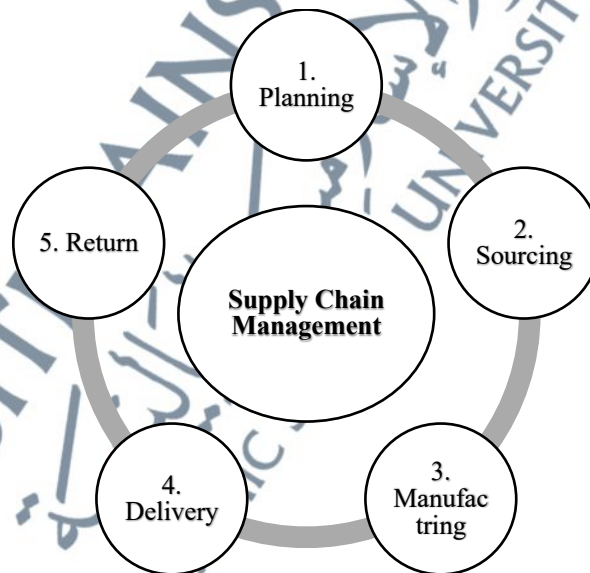
Figure 2.1: Flow of Supply Chain Management

Referring to Figure 2.1 explains the flow of the supply chain which start with the delivery of raw materials from a supplier to a manufacturer and ends with the delivery of the finished product or service to the end consumer. In the current competitive scenario, supply chain management becomes important and get the attention of serious research which organizations facing challenges with finding methods and ways to meet the rising expectation of customers with a manageable cost (Mehrizi, 2014). Supply Chain involve in business activities and companies that need to design, make deliver and use a product or service. Furthermore, organizations will depend on their supply chain to provide them with needs to survive and thrive. Most of the business fits into one or more supply chains and each of them has a role to play. In the supply chain to gain the market share and be successful, firms need to understand and meet the demand of the markets they serve (Cooper et al., 1997; Menon & Shah, 2019).

The process of the supply chain has been used by firms to ensure the efficiency and cost-effectiveness of their operation. The supply chain management process

includes 5 components collection of steps that the firm needs to transform the raw materials to the final product to serve in the market to be consumed (Beamon, 1999; Christopher, 2011; Rozar et al., 2015).

First, the planning stage which is the first step in the supply chain process that requires developing a plan or strategy to understand how the products and services will meet the necessities and demands of customer satisfaction. In this stage, the strategy of planning mostly is aimed to concentrate on how to earn the maximum profit at a lower cost. Furthermore, this stage is one of the most important stages in which a firm need to check the demand for the product or services by identifying the viability, costing, profit and manpower (Beamon, 1999). However, without proper planning or strategy, the firm will face many difficulties in the coming stages of the supply chain process which will make obstacles in the long-term achievement and benefits.



Source: Pandey (2001)

Figure 2.2: The 5 Components of Supply Chain Management

Second, development or source is the next step after the planning stage that involves developing or sourcing the material. This stage aimed to build a strong

relationship with suppliers of raw materials that need for the production process where organization require to select a supplier to deliver and provide items and services to develop a product with identifying the delivery, pricing and payment processes with suppliers also create the metrics for improving and controlling the relationships (Christopher, 1999).

Third, manufacturing or making the product that customer demand concentrates on productivity and efficiency. In this stage, the product is designed, produced, tested, packaged, and synchronized for delivery. The aim of the supply chain manager at this stage is to schedule all the activities required for manufacturing, testing, packaging and preparation for delivery. However, manufacturing is among one of the most important aspects of this process. Hence, it's very impossible to move to the next stage without making this stage complete effectively.

Fourth, delivery and logistics where final products are delivered to customers at the specific locations by the supplier. Essentially, this stage is determined by the customers where they make orders from suppliers and suppliers accept the order and deliver the product to customers to meet and satisfy the demand of the consumers (Cooper et al., 1997). Thus, this step pays attention to this component, and takes good care of it, will benefit from the production and transportation of its goods on time and arrive safely.

Lastly, the return of goods that is defective or unwanted products customers returned after delivering and consumptions. This is the final stage of the supply chain management process that involve the return of defective or damaged goods to the supplier by the customer' which firms require to handle customer's queries and respond to their complaints etc. For many firms, this stage usually is one of the most problematic sections of the supply chain management process which needs to discover a responsive

and flexible network to accept the damage of defective products by the customers (Toms, 2016).

However, no one is incapable of making mistakes or being wrong even machines are having the possibility to fail to function in the activities of supply chain production and some goods it might return to the producers or manufacturer under various circumstances. For example, in 2015 Kanoa's wireless headphones company, the product faced many failures to connect to smartphones and charging problems which lead to the return of the product and consumers return their product but some of them get a refund (Morries, 2017). However, some of the malfunctioning machines may cause serious injury and harm people life. In this case, manufacturing companies must be very careful before displaying the product to customers in the market.

However, with all of these effective decisions and processes of the supply chain, there is a limitation of legacy technologies that can thwart the goal of end-to-end transparency. The first paper published on the topic was by Lee and Miller (1996), about the strategy, environment and performance in the technology context. Hence, these days it might be soon behind us with the advancement of digital technologies that taking over the potential of supply chain management entirely which is disrupting the traditional ways of working (Naway & Rahmat, 2019). The advancement of new technology and increase of climate change can analyse, capture, easily access, integrate and interpret high quality, real-time data which support the process automation, artificial intelligence, predictive analytics and robotics the technologies that in the long term will take over SCM (Lyall et al., 2018; Sazvar et al., 2018). In this case, companies tend to shift their strategies from traditional supply chain management (SCM) to green supply chain management (GSCM) which allows manufacturing companies to achieve competitive advantages and improve social aspects.

2.3 Evolution of SCM to GSCM

Environmental management is one of the main issues in supply chain management (SCM) which requires coordination and integration among organizational process strategy alignment across all firms in the supply chain (SC) to meet the demand of consumers and satisfy their needs and wants (Qorri et al., 2018). The processes in the organization will consist of sourcing manufacturing, distribution, information systems, marketing and reverse logistics. All of these processes should meet the requirements of environmental standards and concerns from government regulators, competitors and customers to reduce the risk of adverse publicity and environmental hazards due to non-compliance with associated government penalties as well as improve supply chain performance (Vanalle et al., 2017). Due to the high competition of the supply chain, companies must concentrate on the responsibilities of environmental protection and its impact on all organizations in their supply chain process (Qorri et al., 2018). However, organizations need to identify and adopt the practice of GSCM that yield competitive advantages in the direction, it will lead to attracting researchers on growing of GSCM interest in the academic literature

Over the past five decades, the concept of supply chain has developed from the dyadic relationship in the data sharing among the customer and supplier to vital coordinated efforts between supply chain accomplices. Recently, the priority is on ecological issues for singular organizations and also for the entire supply chain (Centobelli et al., 2018). Green supply chain management (GSCM) is developed based on the essence of environmental awareness (Srivastava, 2007). According to Seman et al. (2018), GSCM can be described as an environmental practice expanded from green purchasing to integrated with supply chains that start from suppliers to manufacturers, to customers, and reverse logistics referred to as closing the loop. Based on

Mathivathanan et al. (2018), described GSCM as a set of practices that associate actions beginning based on the conception creation and advancing over green product design, purchasing, logistic, manufacturing, and waste dealing. Many researchers have applied several practices of GSCM in this field.

Supply chain management has focused mainly on pre-manufacturing, manufacturing and use. The stage of post-use in the life cycle often indicates on a piecemeal basis and only at a time when the practices deliver benefits to the economic (Abdullah et al., 2016; Jabbour et al., 2016). Supply chain management aimed to produce high-profit products to customers with less cost regardless of the impact on the environment, people and economy (Eltayeb & Zailani, 2014). Nonetheless, the aspect of sustainability that needs to be included in industrial activities has been increasingly accepted. As reported by Jayal et al. (2010), product, process, and system perspectives need to be comprehensively considered to make manufacturing more sustainable. At the process level, toxic wastes, occupational hazards and energy and resources consumption have to be reduced. At the system level, the entire supply chain aspects require to be considered includes all the major life cycle stages, pre-manufacturing, manufacturing, use and post used throughout the multiple life cycles.

In light of the above issues, GSCM is getting attention due to the increase of environmental deterioration such as overflowing waste landfills, depletion of raw materials and pollution in general. Thus, GSCM main aim is to prevent the dissipation of harmful materials into the environment, minimise the wastes within the industrial system and conserve energy resources (Rao, 2019; Wyawahare & Udawatta, 2018). However, this strategy is not only to be environmental friendliness but also to gain a great profit and a good sense of business where firm's find out they need to upgrade their supply chain management from a purely functional role

to a strategic role to maintain an enduring competitive advantage, follow the current environmental legislations through innovation capabilities and improved eco-efficiency (Younis et al., 2019).

In this matter, the involvement of operations managers in earlier environmental management systems is only at arm's length where individual firm's units control the performance of the environment in compliance regulations, product and process design, marketing, logistics and waste management. Furthermore, in the long run, it has been realised that green strategies are required to extend to the entire supply chain to meet the aimed required winning criteria (Ganzarain & Errasti, 2016). This strategy is generally encouraged fast acceptance of the green principle around the globe (Beamon, 1999). In the current situation, there is a substantial need for improvement on the best way to select the most appropriate green strategy in a particular industry context.

2.4 Green Supply Chain Management Practices

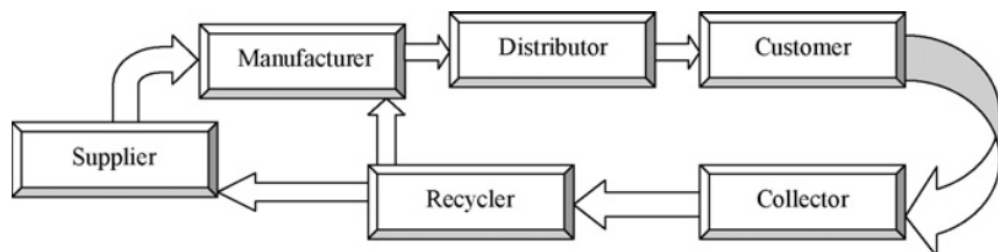
2.4.1 The Conception

Green supply chain (GSC) has been defined in the literature differently. Some have defined it as a closed-loop supply (Beamon, 1999). While some studies have mentioned it as a sustainable supply chain (Luthra et al., 2016) and (Linton et al., 2007) also called it an environmental supply chain and ethical supply chain (Beamon, 2005). Moreover, GSC also has been quoted as a socially responsible supply chain (Salem, 2009). Green supply chain management is a mutual effort over the firm. It is not just by implementing some ecological practices; however, it is a coherent approach that will help the firm to improve the environment and the performance of the organization

throughout management levels (Gábríel, 2016). Likewise, Srivastava (2007), has defined GSCM as incorporating environmental considerations into SCM consisting of product and service design, procurement, manufacturing processes, distribution, and end of life product management to gain sustainable competitive advantage. However, Green supply chain management will assist companies to contribute towards sustainability for their operation. On the other side, it will impact positively the environment which lead to the greening of industry and that is desperately needed in today's world.

2.4.2 The Process of Green Supply Chain Management

The green supply chain is the total of green manufacturing and material management, green purchasing, green distribution and marketing, and lastly investment recovery.



Source: (Olugu et al., 2011)

Figure 2.3: Green Supply Chain Management process

The schematic of material flow and different levels involved in a green supply chain is shown in Figure 2.3 which explain the line of green supply chain activities that should have collaboration among supplier, manufacturers, distributors and customers to minimize the negative impact on the environment and improve the lifecycle of the product. Moreover, to reduce the waste and increase waste the products can be reused, remanufacturing, and recycled and can be established in the reverse logistic stage to

make new or other products with the recycled materials (Olugu et al., 2011). The process of GSCM is a modified process from SCM with implementing additional practices such as recycling, reuse and remanufacturing of the product to save cost and reduce the negative impact to the environment (Zaipul & Ahmad, 2017). Currently, the “green concept” is become a critical issue for manufacturing firms, but when the majority of business is cost-focused, the strategy of implementing and shifting toward green practices is often costly. Rasit et al. (2019) state that manufacturing companies will adopt the practice of GSCM if they identify that this will result in specific operational financial benefits.

Shahriarpour and Tabriz (2017), identified supply chain in three levels upstream, internal and downstream. The upstream supply chain contains the primary providers that each of their suppliers can have other suppliers and the processes for managing relationships with them in which the supply chain, in this case, will be longer. The main activities of this level are purchases and transportations of raw materials. The internal or mid-stream supply chain includes all the activities that a manufacturing firm does on the inputs from the upstream supply chain from when the raw materials are manufactured into the final product and it is ready to be distributed to the market and customers to consume. The main activities of this part include material handling, inventory management, manufacturing and quality control. The downstream supply chain is related to all activities with the final products’ transportation and distribution to retailers and final customers in the market. Moreover, distributors, wholesalers and retailers all strive to carry inventory in quantities needed to fulfil customer orders without overstocking. The main activities of this supply section are storage, packaging and transportation of the final goods to consumers. In this matter, involving green supply chain in the process of taking into account environmental criteria or

environmental consideration in long-term relationships with suppliers, organizational purchasing decisions and making green the supply chain greatly depends on organization nature (Eltayeb & Zailani, 2014; Thaib, 2020).

The high resource consumption, environmental pollution and waste generation leads to fast development in the manufacturing industry which causes a negative impact on the environment (Wyawahare & Udawatta, 2018). However, green supply chain management (GSCM) practices are one of the greatest strategies to overcome these challenges which will enhance the organization performance and at the same time will improve the environmental and social performance (Negi & Anand, 2016). The process of implementing GSCM required strong commitment from related governments, organizations and agencies (Muasya & Kihara, 2018). Furthermore, the implementation of GSCM practices becomes significant turns into a major and important strategic drive for business organizations (Younis et al., 2019).

The term of the green supply chain or sustainable supply chain is aimed to integrate the sustainable environmental process into the traditional supply chain. This will include processes such as product design, supplier selection and purchasing material, distribution, product manufacturing and assembling and end-of-life management (Khan et al., 2016). Instead of mitigating the harmful impact of business and supply chain operations, GSCM will add value or create value to the process and operations in the whole supply chain which will enhance the organization's performance in terms of less waste manufacturing, reduction in manufacturing costs, reuse and recycling of products, positive image building, the efficiency of assets and greater customer satisfaction and this is the main goal of the green supply chain (Khan et al., 2018).



Source: (United Nation, 2019)

Figure 2.4: Sustainable Development Goals (SDGs)

Referring to Figure 2.4 in 2015 the member states of the United Nations adopted the Sustainable Development Goals (SDGs) which aimed to achieve 17 goals by the end of 2030 to end all forms of fighting inequalities, poverty and protect the planet while ensuring that no one is left behind to ensure a happy and peaceful life to people (United Nation, 2019). These goals will lead to influence and help to carry the promise of a better world forward in terms of three main contributions such as economic, social and environmental goals (Willis, 2018). Therefore, we can indicate that SDGs and GSCM are integrating and linking to each other in terms of reducing harm to the environment, good health and wellbeing, clean water and sanitation, affordable and clean energy, responsible consumption and production, and industry, innovation, and infrastructure (Jawaad & Zafar, 2020). However, these integrated goals will lead to the same objective and outcome needed to improve the environmental performance, economic development and social performance.

2.4.3 The Extension of Green Supply Chain Management

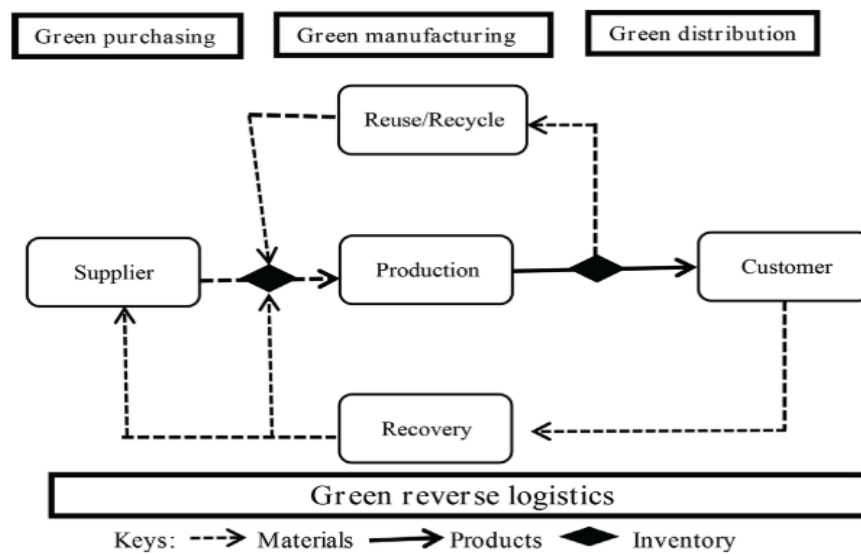
Meanwhile, Beamon (1999), defined GSC as the extension of the traditional supply chain to include activities with the main objective of reducing the impact to the environment of a product throughout the entire cycle such as resource-saving, green design, product recycling and reuse and harmful material. Thus, GSCM practices involve different types of initiatives and activities undertaken by organizations to improve the overall performance of the company, cope with institutional pressure and in turn the overall SC performance (Qorri et al., 2018).

Green supply chain management has expanded over the industry throughout its supply chain process includes purchasing, manufacturing, material management, distribution, and logistics (Mohamad et al., 2018). GSCM is a concept that allows the industry to minimize the adverse impact on the environment by sharing the environmental responsibility in every stage of the supply chain and process in the organization (Wyawahare & Udawatta, 2018). For instant, designing and manufacturing backyard playground equipment for children, if the material could be sturdy enough, customers will be able to pass on the playground equipment to another child after the first child outgrows it. Also, if the playground consists of recyclable materials, such as wood, those materials can have a second and many more life as outdoor furniture, paper, or mulch after the original product is no longer in use (Rahman, 2020).

In recent years natural environment becomes a serious issue and challenge to a business organization as a result of local and global environmental problems. The method of economic consumption leads to having a high level of material and energy utilization among business organizations in their operation. However, the term “business organization” refers to manufacturing firms, which they believed to be

responsible for most of these problems (Beamon, 1999). However, supply chain management (SCM) globally has grabbed the attention of industrialists in the light of strategic planning in the maintenance, design and operation of supply chain processes. SCM is the most important system strategy that has been used in modern organizations with the integration of various operational stages to meet and satisfy the needs of the market and obtain the highest profit for the organization (Shafique et al., 2017; Suryanto et al., 2018; Villanueva & García, 2013). Regardless of the improvements and developments to achieve the best performance and be successful with the assistance of SCM, some manufacturing companies overlooked the impact on the environment, economic and social issues including global warming, health diseases global energy, climate change and ecological concerns in global competition (Suryanto et al., 2018).

In the current situation where the awareness of environmental satiation is growing and firms are facing a lot of pressure from various stockholders which involved customers and government to reduce the harmful impact to the environment (Luthra et al., 2016). Indeed, the business sector has to take into consideration to involve their business into the business practices in the manufacturing and service industry with sustainability and to mitigate the end-to-end supply chain cost to achieve competitive advantages (Gunasekaran & Ngai, 2003; Qorri et al., 2018). In the previous decades, the increasing impact of global warming, waste, climate change and pollution issues have involved growing global attention from experts to concentrate more on findings options and to think more eco-friendly to have optimum possible solutions towards Greening the supply chain management in the production process (Rostamzadeh et al., 2015). GSCM is playing a major role in motivating a firm's sustainability wherein the current case the strategy of implementation GSCM practice deserves a persistent community concern in developing nations.



Source: Khan (2019)

Figure 2.5: Simple Model of GSCM

Figure 2.5 illustrates a simple model of GSCM. The implementation of environmental management principles to the whole set of activities in supply chain management practices such as design, including, manufacturing and assembly, procurement, packaging, logistics, distribution, cycle (Handfield et al., 1997). Khan (2019), in his model of GSCM aimed to integrate environmental thinking into the traditional supply chain management practices, which involved purchasing green materials and components, eco-logical design of products, reengineering of manufacturing steps towards eco-friendly, reverse logistics management of the product after its useful life. Moreover, integrating environmental consideration into firms' supply chain including reverse logistics (Sarkis et al., 2011). Furthermore, reducing and controlling the harmful impacts of the supply chain on the environment with the adoption of ecological design, sourcing green materials and chemicals, and providing green training to employees under ethical leadership.

However, GSCM had caught the attention of scholars following the importance of focusing on the environment and its impact on organization performance.

(Srivastava, 2007) stated that GSCM includes green purchasing, green design, green distribution, green production, reverse logistics and logistics marketing activities. (Walker et al., 2008) expressed that GSCM practices are involved in all stages of the lifecycle of product such as production, purchasing, distribution, use and disposal of the materials. The practice of GSCM host many activates such as production, design, supply, assembly packaging, logistics and distribution (Eltayeb & Zailani, 2014; Handfield et al., 1997; Mohamad et al., 2018). Therefore, the issues of GSCM practices can be argued and examined in a wide range. The limitations of GSCM studies is based on the researcher objectives and goals as in the case of any supply chain management researchers (Zhu et al., 2008).

In this case, GSCM is having a significant link to the concept of eco-friendly process in the SCM to have an improvement to achieve environmental sustainability that driven through different green practices such as green distribution and warehousing, green manufacturing processes, green purchasing and green transportation with the usage of biofuels and the end life management of the product (Christopher, 2011). This will benefit to achieve sustainable development in all aspects of social, environmental and economic as well as to achieve competitive advantage in the industry. In another case, green supply chain practices have shown positive outcomes for many firms in various aspects, but it is not without facing some challenges in its implementation (Allaoui & Goncalves, 2013). However, green supply chain management practices and implementation challenges might require manufacturing firms to make a lot of effort which may involve a restructuring of the business processes and the product itself (Gajendrum, 2017; Kumar et al., 2018).

2.5 Benefits of Implementing GSCM Practices

Applying or implanting the strategy of green supply chain management into the manufacturing firms will cost additional expenses and initially, firms will face various challenges in implementing GSCM (Zulkefli et al., 2019; Wyawahare & Udawatta, 2018). Furthermore, when people hear greening the supply chain first thing that comes into their mind is banning toxic chemical substance usages or reducing emission or waste to the environment. However, it is more than just reducing the usage of harmful materials and pollution. According to Chin et al. (2015) and Tonape & Owk (2013), the principles of GSCM can be applied in all departments in the firm. The impact of these implementations will expand to all areas both tangibly and intangibly

Tonape and Owk (2013), highlighted the benefits of GSCM in three categorized, immaterial, material and emotional. In terms of materialistic perspective, GSCM would help reduce the environmental load for the environment also will benefit suppliers to have lower cost prices, lower the cost for producers, lower cost of ownership for customers and lessening consumption of resources for society. Lastly, the perspective of emotions, GSCM can be an advantage to motivate stockholders towards the environment by improving the reputation of the company to the minds of suppliers and producers, assisting customers to have good and positive feelings about the quality of life, and bringing industry on a positive track for the societal good.

2.5.1 Lowered Costs and Increased Efficiency

At the core of GSCM is the principle of minimizing waste by growing efficiencies. Effective management of resources and suppliers will enable to reduce production costs and promote recycling which will assist in to reuse of raw materials. Moreover, the manufacturing process and production of hazardous substances can be

minimized or reduced which will prevent the company from being found as a consequence of violating the regulation of environmental regulation (Shibin et al., 2016). As a result, the relevant operational costs are minimized whilst; the efficiency of using resources is improved. Various studies have shown that cost reduction and profitability are some of the main motivators for businesses to become green in the supply chain (Allaoui & Goncalves, 2013; Christopher, 1999; Eltayeb et al., 2011; Kadier et al., 2018; Rahim et al., 2016).

At the level of GSCM practices, the key driver for businesses aiming to save cost, efficiencies and higher profits and have become recognized as one of the major drivers of sustainable supply chain changes (Benton, 2018). It's generally perceived that GSCM promotes synergy and efficiency among business partners and their local corporations, and assist to achieve cost savings, enhancing environmental performance and minimizing waste. This strategy is expected to enhance the corporate image, competitive advantage and marketing exposure (Rao & Holt, 2005). However, some organizations are considering customers interest in the environment as a plus which they can switch the interest of the public in all things green into increased profits.

For example, General Motors reduced their disposal cost by \$12 million by implementing GSCM practices which apply for the reusable program with their suppliers. General Motors is likely showing high interest in green practices if they were making record profits, but an attempt to reduce costs in their supply chain which they found that reduced cost they identified complemented the firm's commitment to the environment (Martin, 2019). General Motors found that the cost reduction they identified complemented the firm's commitment to the environment (Shibin et al., 2016). This example will support that greening the supply chain will give many advantages to the firm's environmental and financial performance.

2.5.2 Improve Organization's Public Image

The stronger the green supply chain practices implementation, the higher the public relations and marketing boon which will increase the image of the company among suppliers and customers (Shafique et al., 2017). Moreover, by publishing or informing customers and supplier about your practices of the green supply chain by applying and using friendly materials to the environment which will reduce the negative impact to the environment also apply other green practices such as green purchasing, green production, green packaging, green logistics and green distribution, this metric will easily resonate with the public (Ann et al., 2006). One of the main practices and implementation of green supply chain management is through gaining the certification of ISO 14001 "Environment Management System" which will help to enhance an organization economic performance and at the same time it will improve its environmental performance. Furthermore, manufacturing companies that applied ISO 14001 in their production process lie in cost savings through energy consumption, raw material input, waste management, environmental impact reversal as well as an improved public image (Ahmed et al., 2018).

Implementing and designing a greener supply chain is a win-win case for the firm, shareholders and the planet. When the supply chain become greener, waste is driven from it and when waste is driven from the supply chain, the cost of the production is minimized (Muasya & Kihara, 2018; Zhu & Sarkis, 2007). Hence, this will lead to making all the parties satisfied in terms of dealing with the firm. In reality, the ability to be the leader or gain the attention of customers depends on the effectiveness of one's operating systems as it does on the presentation of the product, influencing consumer perception and the creation of an image (Hassan, 2016). For example, McDonald's and Walmart or any of the other frequently cited paragons of service excellence is due not

to their choice of an advertising agency, but instead to their recognition and brand image that managing the logistics of service delivery on a consistent basis is the crucial source of differential advantage (Patidar, 2018).

A study conducted by (Hoejmose et al., 2012) concentrates on finding out the adoption of green supply chain practices in the hotel industry. The findings of the study indicate that the scrutiny of stockholders pushed and pressurized restaurants to implement green practices in their operations and services to achieve the capability and reflect a great image of the food and beverage industry. Moreover, a company that implements the practice of a green supply chain in its production and manufacturing process will attract new clients, satisfy the existing and improve its image which places the company in a greater market position.

2.5.3 Enabling Technologies & Information

The ability and flexibility to access technologies for local and lower tier suppliers in the process of the supply chain can be confirmed through better supplier collaboration. According to (Shibin et al., 2016) firms concentrate on technologies and information to reduce wastage and pollution. Cleaner technology will assist to improve economic and environmental performance, reduce pollution and waste in the production process (Tramarico et al., 2017). Flexible manufacturing systems combine high technology to receive the benefits of both technology and numerical control machine tools (Dubey et al., 2015). To improve productivity, reduce lead time, and improve customization and quality, information technology and in particular digital manufacturing will help to achieve these objectives (Lyall et al., 2018).

According to Jabbour et al. (2016), the unavailability or lack of the newest technologies in an organization gives difficulties to implementing the strategies in green

supply chain activities. The flexibility of the green supply chain will need to have reconfigurable, recyclable and cleaner technologies which aimed to create a better impact on the environment and help in cost-effectiveness and maintaining flexibility. The improvement in green technology of enabling the company to reduce waste material which means companies that formerly discarded waste products; now has the ability to reuse the wasted or unwanted materials. Furthermore, costs will inevitably fall helping more businesses with the issues of waste as the recycling technology becomes more available (Wyawahare & Udawatta, 2018).

These strategies activities are also associated with sharing or resources such as personnel and equipment, among supply chain members to enhance and develop the performance of manufacturing along the chain (Gupta et al., 2013). An example of technological advancement by Kodak starts in the early 1990s when the need for technological advancement to green operation become more popular. The upcoming firms have encouraged other companies to be more eco-efficient and environmentally sustainable. Kodak is one of the great examples firms that has utilized the use of technology wherein 1990 they reported 310 million single-use cameras to return and remanufacture. (Kodak, 2019). The reason behind the recall of the single-camera of Kodak is the success that came from its product design. Kodak has simple, reusable and easy to recycle products and this will lead to enabling the company to reuse the products and save costs (Ganzarain & Errasti, 2016).

2.6 Background of ISO (International Organization for Standardization)

The background of the ISO organization began in 1946 delegates from 25 countries met at the Institute of Civil Engineers in London when they decided to create and launch a new international organization to facilitate the international coordination

and unification of industrial standards. Following to next year in 1947 the organization is officially starting operations and today there are members from 164 countries and 781 technical committees and subcommittees to handle the standards development and take care of it (ISO, 2019). In this study, it focused on the Environmental Management ISO14001 which defined as a global standard for Environmental Management Systems which aimed to provide for companies the elements for the environmental management system to be effective which mainly aimed to protect the environment and to reach to the changes of environmental conditions in balance with the needs of socio-economic, which can also be integrated with other management system requirements (Hutchison et al., 2017).

Table 2.1: Worldwide Management System Certification Status for various ISO Schemes

Management Systems Standard	Certification Type	Number of certificates in 2021
Quality management systems	ISO 9001	1,077,884
Environmental management systems	ISO 14001	420,433
Energy management systems	ISO 50001	21,907
Information security management systems	ISO 27001	52,687
Food safety management systems	ISO 22000	36,124
Medical devices - Quality management systems	ISO 13485	27,907
Societal security - Business continuity management systems	ISO 22301	2,559
Information technology - Service management	ISO 20000-1	11,769
Security management systems for the supply chain	ISO 28000	584
Road traffic safety management systems	ISO 39001	1,285
Total		1,956,811

Source: ISO (2021)

Currently, the ISO survey of management system standard certification they published an annual survey about the number of valid certificates to ISO management system standards worldwide which we can refer to Table 2.1 it shows the number of

ISO certificates that have been given to firms globally that have 10 different management system standards with total 1,966,811 certificates issued worldwide in the year of 2021. Thus, this study will concentrate on sampling the manufacturing firms which practice green supply chain management and are certified under ISO 14001 standard Environmental management systems in Malaysia. These manufacturing companies are selected due to their involvement than expected in implementing GSCM activities also expected to know green practices (Eltayeb et al., 2011). As stated by Mohamad et al. (2018), ISO 14001 standards serve as the platform for a green supply chain and create business opportunities for going green.

2.6.1 ISO 14001 Environmental Management System

Organization practices green supply chains they are required to implement ISO 14001 to enhance their activities process. The ISO 14001 agreed on a standard internationally that sets the requirements for an environmental management system that assist companies to improve their environmental performance through the reduction of waste and more efficient use of resources, gaining a competitive advantage and the trust of stakeholders (Malaysian Standard, 2015). Moreover, ISO 14001 is applicable for all types and size of organizations, private or government which require companies to consider the environmental issues which are relevant to their operations in (Murphy et al., 1994; Szymankiewicz, 1993) the manufacturing process such as water and sewage issues, air pollution, waste management, climate changes mitigation and adaptation, soil contamination resources use and efficiency (ISO, 2015).

Furthermore, ISO 14001 is an international standard that specifies requirements for the Environmental Management Systems which is used widely as a standard Environmental Management Systems in the globe. However, firms that

implement ISO 14001 by the standard are required to systematically manage and identify the aspects of the environment and the results that are led by the impact resulting from their products and services activates which aimed to improve the environmental performance. There are various benefits for companies hold the certificate of ISO 14001 the Environmental Management Systems which enhances image as an environmentally responsible organization, helps an organization to improve its environmental performance, facilitates access to the growing “green market”, provides assurance of legal compliance and save cost through the efficient use of resources and proper management of waste.

Table 2.2: ISO 14001 Certification by Top 30 Countries 2021

	Country	Certificate
1	China	217,592
2	Japan	21,976
3	Italy	18,135
4	United Kingdom of Great Britain and Northern Ireland*	17,378
5	Spain	14,122
6	India	9,275
7	Germany	9,256
8	Korea (Republic of)	6,886
9	France	6,392
10	Romania	6,174
11	Czech Republic	4,539
12	Thailand	4,381
13	United States of America	4,171
14	Australia	3,468
15	Hungary	3,279
16	Colombia	3,076
17	Brazil	2,957
18	Sweden	2,854
19	Poland	2,831
20	Turkey	2,763
21	Indonesia	2,729
22	Taiwan, Province of China	2,614
23	Malaysia	2,560

24	Netherlands	2,445
25	Viet Nam	2,390
26	Switzerland	2,203
27	Bulgaria	2,166
28	United Arab Emirates	2,060
29	Mexico	1,980
30	Greece	1,891

Source: ISO (2021)

Referring to Table 2.2 displays the top 30 countries with ISO 14001 valid certificates. We can indicate that the firms in the top 5 countries certified with ISO 14001 are China with 217,592 certificates, Japan 21,976 certificates, Italy 18,135 certificates, United Kingdom 17,378 certificates and Spain with 14,122 certificates. However, these countries are highly advanced in practising GSCM with high technology and developed economics. Moving specifically to Malaysia ISO 14001 we can see it ranked 23rd with 2,560 valid certified firms which practice GSCM. Hence, Malaysia is in the context of developing countries where they still need to improve their knowledge and practices of GSCM and in terms of research in a low stage which they need further studies about this issue (Sorooshian & Ting, 2018).

However, the Environmental Management System (EMS) becomes one of the significant tools to identify, control and monitor the potential impact on the environment and the main requirements for the manufacturing industries (Mohamad et al., 2018). The criteria standards it has been set for an environmental management system to improve the environmental performance also maps out the outline where the company can follow to set up an effective environmental management system. This standard will allow the companies in Malaysia to reduce waste which will lead to driving down costs also improve resource efficiency. Besides, companies certified with ISO 14001 will have the access to assure organization management, employees as well

as external stakeholders that environmental impact is being evaluated and improved to achieve the company's environmental and economic goals. By complying with the standards, it will assist these Malaysian companies to comply with the legal requirement set out by the Environment Quality Act 1974 (Act 127) and the relevant regulations while providing the benefit of fulfilling social responsibility and business requirements on environmental management. The environmental management system also forms the building block for Green Supply Chain Management and by complying with EMS.

The existence of the ISO 14001 standard is one of the driving forces to a time where companies are not practising to protect the environment for business activates, but rather a competitive need for survival. By adapting the extensive of ISO 14001 standards, it will predict the green activities and practices which will become the norm among manufacturing Malaysian firms as the advantages are evident through the implementation of the environmental management system. These advantages will make a significant impact on the public awareness of the overall operating efficiency of the organization, saving costs via product recycling, enhanced quality of product and service, efficient use of natural resources, lower rejects and reworks level and reduced cost of packaging.

2.7 Dimensions of GSCM Practices

In the concept of green supply chain practices dimensions, there is no consensus in the literature (Eltayeb & Zailani, 2014). The beginning studies of GSCM approached the concept from the perspective of purchasing. Therefore, these various studies only focused on green purchasing as the GSCM dimension (Min & Galle, 1997; Zsidisin & Hendrick, 1998). Other studies examined GSCM in the framework of logistics. Also, reverse logistics (Barnes, 1982; Pohlen & Farris, 1992). Recent studies integrated

purchasing, production, marketing, logistics and reverse logistics into GSCM (Gajendrum, 2017; Hsu et al., 2016; Mohamad et al., 2018; Rasit et al., 2019; Scur & Barbosa, 2017).

Moreover, Rao and Holt (2005), investigated GSCM and a demonstrable link between such measures and improving economic performance and competitiveness is necessary. The study constructs greening the inbound function of the supply chain; greening production; greening the outbound function; competitiveness; and economic performance. Another study was conducted by (Shang et al., 2010) in electronics-related manufacturing companies. The study examined GSCM by using multiple dimensions. The first dimension, green manufacturing and packaging which production planning and control focused on reducing waste, optimizing materials, selection of clean transport methods, use of reusable and recyclable packaging. The second dimension, the environmental participation dimension which consists of the formation of an environmental management system and provision of environmental training programs for the employees. The third dimension is green marketing that involved sponsoring activities that are related to the environment, environmental labelling and aimed to include updates on the firm website about the issues of the environment. The fourth dimension is a green supplier dimension which integrates with selecting suppliers based on environmental criteria and supplier environmentally friendly practice evaluation. The fifth dimension is a green stock dimension that deals with the sales of excess, scrap and used materials. The last dimension is green eco-design and packaging that are involved in the design of products for reduced consumption of material and energy (Shang et al., 2010).

However, to investigate the extent of GSCM practices, the study developed a measure of each variable based on previous studies and self-contract. In this study, green supply chain management practices have five dimensions namely: internal environmental management, eco-design and packaging, green purchasing, cooperation with customers and investment recovery (Çankaya & Sezen, 2019; Eltayeb & Zailani, 2014; Green et al., 2012; Hsu et al., 2016; Hyland & Gieskes, 2017; Luthra et al., 2016; Abdullah et al., 2011; Scur & Barbosa, 2017; Seman et al., 2018; Shafique et al., 2017; Srivastava, 2007; Suryanto et al., 2018; Zhu & Sarkis, 2007).

2.7.1 Internal Environmental Management

Internal environmental management is defined as the creation of the organization to its environmental targets and environmental protection policies to ensure the protection of the environment (Çankaya & Sezen, 2019; Carter & Carter, 1998). Wu (2013) described internal integration as “level of integration in combining and improving information and internal resources in the company to generate knowledge sharing beyond the boundaries of individual functions or departments in reducing and preventing pollutions”. Communication and cooperation are crucial to successful environmental practices as GSCM involves all departmental boundaries between and within organizations (Aspan, 2000). Zhu et al. (2008) also stressed about the influence of coordination across functional department within the entire supply chain to improve environmental management.

According to Zhu (2008), believed it is necessary this approach needs commitment and support from senior management and middle management as well as support from middle management and other employees, is critical for the successful implementation of GSCM in industries and adoption of most innovations, technology,

programs and activities (Green et al., 2012; Ghazilla et al., 2015). Furthermore, this practice is aimed to make improvement and development in green supply chain management as one of the strategic organizational imperatives through commitment and support of the imperative from senior and mid-level managers (Green et al., 2012; Zhu, et al., 2008). A study conducted by Feng et al. (2018), investigated the relationship between GSCM and company performance in China. The researchers conduct the study among 126 automobile manufacturing companies. The study applies the mediating effects of operational performance and environment on the relationship between financial performance and GSCM. The results suggest that the environmental management system is one of the main players of internal environmental management and its other roles to complement efforts to cooperate with external supply chain partners.

Referring to Darwish et al. (2021), indicate that one of the objectives of internal environmental management is to implement policies for acquiring environmentally friendly material and resources and utilize them taking the environmental aspects under consideration. Under IEM, eco-friendly technology and machinery are used, producing minimum toxic and waste substances. The effectively implemented practices of IEM it will contribute enormously to the environmental performance of an organization (Sobry et al. (2022). Therefore, implementing the practice of IEM within a particular chain node it will assist supply chain management to achieve the environmental demands of the general public, customers and government regulators.

A study conducted by Choi et al. (2018) find out internal environmental management positively influenced firm's manufacturing performance. Moreover, IEM activities will significantly reduce energy usage, use of resources, emission of pollutants and waste recycling. Another study conducted in among 4,187 manufacturing firms in

Spain demonstrated a significant improvement in green performance due to IEM interventions (López-Gamero and Molina-Azorín, 2016). However, the successful implementation of GSCM practices requires effective, committed and persistent leadership to achieve the goals of an entire organization, the organization should consider its organizational readiness and resource capabilities defined by endogenous factors such as top management support, cooperative organizational culture and ISO 14000 certification (Uddin, 2021). However, there are many organizations going toward environmental direction these days with their environmental management systems, environmental auditing of departments, internal evaluation of environmental reports, and certification of ISO 14001 (Klassen & Johnson, 2004; Zhu et al., 2010). Therefore, cooperation from within the organization is essential to ensure sustainable performance in achieving competitive advantages, economically and socially as well as achieving environmental objectives.

2.7.2 Green Purchasing

The second dimension is green purchasing which is defined as the consciousness of the environment in purchasing practice that plays a big role to ensure the purchased products meet the requirement for the environment to be produced from any negative impact and its objective to reducing sources of waste, reduce or eliminate hazards items and promoting recycling and reclamation of purchased materials (Carter & Carter, 1998). The institute of supply chain management define green purchasing “as making environmentally conscious decisions throughout the purchasing process, beginning with product and process design and through product disposal” (APICS, 2013). In this matter, green purchasing in supply chain is supposed to address some of the pressing

environmental issues such as ozone layer depletion, global warming, and hazardous waste.

The raising awareness in the recent times regarding environmental protection has triggered more interest in green supply chain, sustainability and green initiatives as they are interrelated. Green purchasing is concerned with the purchase of products that emanate from energy efficiency, bio-based and recycled content, non-ozone-depleting substances, green power, and other environmentally friendly products (Kohnen, 2011). One of the main criteria of green purchasing is to concentrate on cooperating with suppliers in order develop products that are sustainable for the environment (Zhu, et al., 2008). In addition, the selection of green suppliers is guided by global regulations for environmental protection. The rules and regulations address pertinent issues for environmental management from production of products/services to consumption (Aghelie, 2017). For this reason, the green purchasing function is also an important component of GSCM practice.

The world demand for sustainable products solutions is rising significantly in order to comply with legal regulations and growing environment awareness. In this situation, manufacturing companies are required to implement green practices in their supply chain management practices. For instance, in developed country such as Germany in their plastic manufacturing process they are implementing green purchasing by replacing their raw material PET (polyester) to PE (Polyethylene) which provides the best solution for PET replacement, with the highest quality and cost-effectiveness which enable recyclability. However, this process turns PE raw material into powerful, long-lasting, and industrially compliant product for a wide range of uses and purposes (Meftah, et al, 2021). This green purchasing strategy can be implemented

in Malaysian manufacturing firms to achieve competitive advantages and improve their social performance.

The linkage between organizations and the negative environmental performance is one firm can impact other badly. The regulation has been implemented on the suppliers to protect themselves from the devastating environmental effects of these suppliers specifically in developed countries (Rao, 2019). For instance, Dutch customs agents barred PlayStation game machines 1.3 million of its selling PlayStations as its border because cables in the play station consoles were found to contain unsafe levels of cadmium. These environmentally unsafe cables were manufactured by Sony's suppliers. As a result, Sony had to bear the extensive costs in replacing the parts, storage, and repacking the goods in addition to the delay in the sales of \$160 million worth of the machines (Lee, 2008). Therefore, green purchasing has emerged as an important component of environmental and supply chain strategies for a number of companies. For example, IBM, Xerox, Ford, GM, and Toyota requires their suppliers to develop environmental management systems (EMSs) consistent with ISO 14001 certification (Harris, 2006).

Green purchasing deals mainly with the controlling environmental performance of suppliers which aimed at conserving natural resources, sustaining the quality of natural environment, preventing pollution, reducing the use of resources, and minimizing the dumping of wastes (Abdallah and Al-Ghwayeen, 2019). In the Malaysian context, green purchasing activities are carried out by large firms in order to control the performance of suppliers (Eltayeb et al., 2011). Moreover, the implementation of green purchasing in the practices of green supply chain management will encourage suppliers to develop green inputs, raw materials and promotes the collaboration of purchasing company and the suppliers (Choi et al., 2018). In the other

hand, implementing green purchasing practices will have additional cost to the firm and might discourage companies from applying them in the production process (Nguyen et al., 2017). Nevertheless, the demand for eco-friendly products has been increasing owing to increased environmental awareness. Therefore, green purchasing plays a vital role in demonstrating successful environmental performance for manufacturing firms through incorporation of eco-objectives in the process of procurement.

2.7.3 Eco-Design and Packaging

The third dimension is eco-design and packaging which requires manufacturers to design products that will able them to reduce and avoid the use of hazardous products within the manufacturing process also reduce the high consumption of energy and materials that facilitate the reuse, recycling, and recovery of components materials and parts (Zhu, et al., 2008). The practices of this storey stated by Rasit et al. (2019), such as product design comprises parameters such as ideal consumption of material or energy, reduction of wastes, minimisation or avoidance of usage of hazardous materials in product development. This practice needs efficient usage of friendly energy sources such as biodegradable energy sources and solar energy during manufacturing which aims to reduce the environmental impact and consequently increase the productivity in the firm.

Eco-design and packaging it called also for the environment or green design which refer to the identification of environmental aspects of product over the whole life cycle and the integration of these aspects into product development. In the internal aspects it focused in the type of green supply initiative, eco-deign requires the organization to develop the environmental attributes of products internally together with the collaboration or interaction with external parties such as customers and suppliers

(Le, 2020). The aim of eco-design and packaging is to reduce the negative impact of the products in the entire life cycle from acquiring materials to manufacturing and use and ultimately to its final disposal without compromising other essential product criteria, such as function, cost, performance, quality, or legal and technical aspects (Zhu, et al., 2008). Thus, eco-design and packaging integrate environmental aspects into the product design process, taking into consideration the entire flow of the product in its supply chain. This consideration is very important, because most environmental impact arising from the production, consumption, and disposal of the product are direct consequences of decisions made in the design stage.

Likewise, Zhu and Sarkis (2007), provided some evidence of eco-design and packaging practices that will benefit the organization to achieve access in green markets, enhancement in reuse the products, remanufacturing chances and developed eco-efficiency which subsequently will lead the organisations to gain sustainability performance. The success of eco-design will demand cooperation's of cross functional between organizational units for both outside partners and inside company throughout the supply Malaysia management (Suryanto et al., 2018). In the Malaysian context, further support eco-designs link with GGSCM practice into the Malaysian Environmental Protection Agency programs which give the green supply chains as core aspect of their designs for specially in their environment programs Zailani et al. (2012). Furthermore, eco-design and packaging require firm to improve the environmental attributes of its products internally, with little cooperation or interaction with external parties such as suppliers and customers.

The important of eco-design and packaging it will provide a systematic method for manufacturing companies which lead to reduce the environmental impact of their products and process while simultaneously reduces costs and increases product

marketability (Hsu et al., 2016). However, by reducing the adverse environmental impact of a product across its raw material acquisition, manufacturing, distribution, use, and disposal, eco-design addresses environmental problems resulting from both the production and consumption of a product. In contrast, a conventional product design view focuses solely on quality, cost, ergonomics, and safety. In summary, eco-design establishes guidelines for design engineers pertaining to the environmental safety and soundness of a product. The impact of the product's entire life cycle is evaluated according to various aspects, such as alternative options for reducing waste and energy, recycling, or the elimination of product waste during manufacturing.

2.7.4 Investment Recovery

The fourth dimension which comes forward as one of the most frequently investigated dimensions in GSCM studies is investment recovery that requires the sale of excess inventories, scrap and used material and excess capital equipment (Zhu, et al., 2008; Zsidisin & Hendrick, 1998). The main aim of investment recovery is to recover the highest value from obsolete, end-of-life products and surplus items. In other words, is trying to make these items to be able to include these items to reverse the logistics process where they can be disposed or revoked in the correct way which will not harm the environment and make a positive impact on organization performance (Çankaya & Sezen, 2019). In order to achieve sustainable supply chain management, firm required to interact between forward and reverse flows has to be considered, and this requires the involvement of investment recovery (Engeland et al., 2020).

Investment recovery was introduced early in the prior studies as one of the firm's critical supply chain practices and is usually implemented at the end of supply chain (Tseng et al., 2022). Investment recovery refers to a practice of promoting the

selling of excess materials, decreasing energy consumption from equipment and machines and recycling used products. Its objective is to encourage the recycling of used products into other variable materials so as to reduce their unfavourable influences on the environment (Fang and Zhang, 2018). Furthermore, it aims to get back the value of surplus inputs to cut the waste of initial investment, which in turn lowers the cost of the product or service supplied for customers (Wu et al.2010; Hu et al.2019). In many cases, this practice also has a beneficial environmental impact due to redirecting excess materials and surplus equipment to other firms, extending their life cycle and usefulness.

Moreover, as environmental concerns increase, the value of products, material and resources needs to be maintained while still controlling the impact of supply chain's activities on environment; thus, this involves higher level recovery options (Tseng et al., 2022). For this objective, investment recovery is considered as applicable practice due to recovering, redeploying, and reselling existing surplus materials, used products and idle or redundant equipment. Hu et al. (2019) discussed the investment recovery as practice which aims to recover the value of surplus assets to reduce the waste of initial investment, thereby reducing the price of services and products offered to the market. Investment recovery is argued to be one necessary GSCM practice because of the impact on improving the performance efficiency of a firm.

Investment recovery not only relates to environmental and economic aspects but also preferably mentions the social aspect of GSCM practices. This last practice is constructed by four attributes including sale of excess material/inventories; sale of scrap/used materials; sale of excess capital equipment; sales of by product and waste. This practise it can help manufacturers reduce the costs of raw materials and compliance, win new customers, and increase revenue (Zhu et al., 2013). Therefore, the

practices of investment recover will provide benefit to the manufacturing firm an additional amount of income and prevent unnecessary storage of these assets. In short, investment recovery also consists of reusing products or goods, remanufacturing or recycling activities.

2.7.5 Cooperation with Customers

Lastly, in many cases, customers are the main stockholders in the supply chain where they have an important role in putting pressure on companies to redact the negative impact in the production and process (Freeman, 1984). Cooperation with customers occurred when they require working with customers to design a cleaner production process that will contribute to producing environmentally sustainable products with green packaging (Green et al., 2012). However, this practice is significantly become one of the drivers for green initiatives by asking for green products and processes through customers (Zhu et al., 2012). A study conducted by Sundram et al. (2017), confirmed that cooperation with customers has a strong relationship with company performance to achieve competitive advantages. Similarly, a study by Mathu (2019), confirmed that cooperation with customers significant significantly improve organizational performance. Therefore, the cooperation with the customer will help boost the firm's environmental and operational performance which will lead them to achieve competitive advantages in the global market and improve social performance.

In the emerging business environment, the relationships of business organizations with their customers are of great importance for social aspects. In the case of the company's struggle to achieve superior performance, the cooperation from customers and its importance cannot be denied. The investigation by Theyel (2006) states that customer relationship management (CRM) is established, which manages to

interact with the past as well as existing and potential customers to meet the organizational goals. customers' cooperation in environmental programs proves to be healthful in environmental programs as they help the organization to keep its environmental activities updated.

According to Walls, Berrone, and Phan (2012), customer views and observations about environmental aspects help the industrial organizations to launch environmental programs. Moreover, by having effective customers cooperation with the industrial organizations, it can change products features and characteristics of advertisement material according to environmental requirements. Besides, customers may cooperate with industrial enterprises in the proper disposal of products and services and they may also cooperate with enterprises in launching eco-friendly marketing channels which do not harm natural resources of the country and the health of the general public; thus, the cooperation from customers help in meeting the environmental requirements of the general public, customers, and government regulators (Large & Thomsen, 2011).

Cooperation with customers will assist industrial enterprises to keep a check on the negative impacts of their activities and machinery on society and the environment (Zhu et al., 2017). Likewise, cooperation with customers creates environmental awareness and helps carry out successful environmental programs that improve social performance and help to achieve competitive advantages in the market. Similarly, the procurement of green material and other resources helps industrial enterprises to minimize adverse environmental effects. Besides, cooperation with customer proves to be beneficial in this respect as it enables the business management to keep an eye on customers' environmental requirements. Thus, general public can reshape their activities, procedures, and manufacturing to meet those requirements.

2.8 Green Supply Chain Management in Malaysia

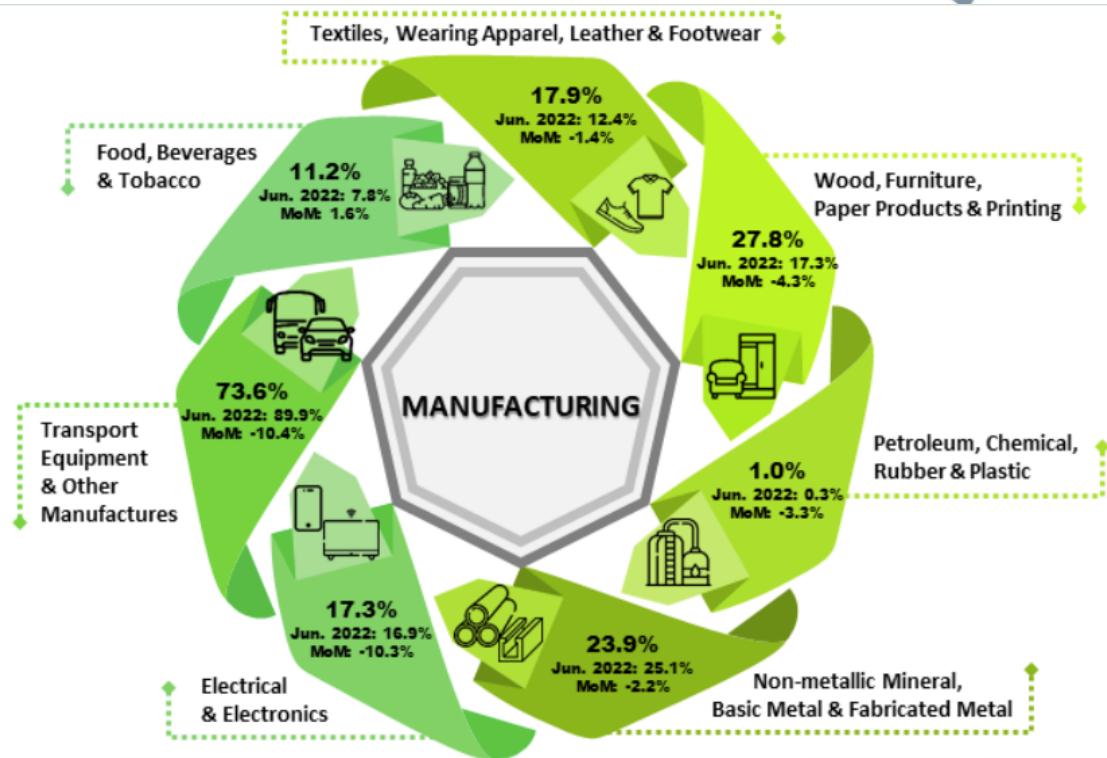
2.8.1 Demographics of Malaysia

Malaysia is a federal constitutional monarchy located in Southeast Asia. In the 1980s the population of Malaysia was 13.79 million and now increased to 31.62 million in 2019. The country consists of 13 states and three are federal territories which covers a total of 329,613 km² that will list as of 66th largest country by total land area. Malaysia is divided into two land areas East Malaysia and West Malaysia, and the South China Sea separate both areas. The Independence Day of Malaysia is received on 31 august 1967 from the British (DOSM, 2019).

2.8.2 The Revolution of the Malaysian Economy

Malaysia has made great improvements in socio-economic development since it gained independence in 1957. The transformational story of Malaysia economic improvement from one sector to another started from many years in the agricultural sector that was the mainstay of the Malaysian economy mainly rubber and timber that contribute 50% to Malaysia's GDP where this sector has been the backbone of the Malaysian economy by producing agricultural products for domestic consumption, as the earner of foreign exchange (Dardak, 2015). Diversification efforts in agriculture saw the successful establishment of oil palm and cocoa. In the middle of the 1970s aggressive industrialization together with strong and heavy investment in the service sector that was driven by public sectors such as banking and telecommunications that has a good influence on the growth of these sectors and the economy (Manaf & Ibrahim, 2017). Following that, at the end of the 1980s, the contribution and growth of agriculture start to decline. However, the economy of Malaysia shifted from being agriculturally based to one based on manufacturing and industry (Mohd et al., 2009). In 1987, the

country for the first time in the nation's history, manufacturing become the leading sector of the economy and overtook agriculture which makes Malaysia remain one of the world's largest producers of palm oil.



Source: DOSM (2022)

Figure 2.6: Index of Industrial Production, Malaysia 2022

According to the Malaysian government report in July 2022 by the Department of Statistics Malaysia Press, the index on industrial production in Malaysia has shown there is a general increase in the manufacturing industry (DOSM, 2022). Referring to Figure 2.6, in July 2022 Malaysia's Industrial Production Index (IPI) grew by 12.5% driven by manufacturing sector compared to the previous year. The growth of the Malaysian industrial production index is recorded a growth by the increase of indices sectors, manufacturing (14.9%), index of mining (3.2%) and index of electricity (13.2%). The contribution of other major sub-sectors in the stage of growth in

manufacturing sector was Transport Equipment & Other Manufactures Products (73.6%), Electrical & Electronics Products (17.3%) and Non-metallic Mineral Products, Basic Metal & Fabricated Metal Products (23.9%) with total sales value of Manufacturing sector stood at RM148.4 billion in July 2022 grew (23.8%) as compared to the same month in 2021.

Moreover, annually there is an increase in the total number of employees engaged in the manufacturing sector where in 2022 the number of total employees involved in the manufacturing sector was 2,300,906 persons and it increased by 4.1 per cent as compared to 2,210,084 persons in July 2021 (DOSM, 2022) These statistics and numbers will indicate that Malaysia has grown in the manufacturing sector which contributes the growth of the overall economy. However, this will lead to impact rapid industrialization which has a detrimental effect on the environment and this problem is driven by the increase of the pollution, waste and rapid consumption of natural resources.

2.8.3 The Implementation of GSCM Practices in Malaysia

The issue of the environment becomes very important that grab the attention of the government of Malaysia and its public. In 1974 the Environmental Quality Act is established and has been amended several times which include 18 sets of regulations to assist implement projects relating to sewage, clean air and industrial effluent assessment (Eltayeb et al., 2011).

As mentioned above, manufacturing companies in Malaysia are one of the main consumers of resources and emit environmental emissions due to the manufacture of goods and services to meet the demand of customers in the market. However, these are not very significant compared to the negative impact coming from products generated

in the life cycle. For instance, durable products such as automobiles and home appliances. These products carried a lot of loads to the environment from the use and disposal stages are much greater than that from the manufacturing stage (Shamsuddin et al., 2017). The other products such as aluminium foil and towels paper carry a higher load to the environment from the manufacturing stage. However, the total load is still greater than that from the manufacturing stage. Therefore, environmental loads occurring throughout a product life cycle are the main cause of today's environmental problem (Eltayeb & Zailani, 2014).

In the Malaysian context, the problem of GSCM and innovation capabilities can be categorized at the level of preliminary. Multiple companies in the country are still left behind. The concept of the green supply chain has not been implemented in business procedures (Abdullah et al., 2016). As mentioned by Eltayeb et al. (2011), the level of acceptance and involvement in green supply chain practices is lower in the wholly-owned organization by Malaysian as compared to overseas companies and multinational companies. The difficulties which delayed the concept of implementing GSCM in Malaysia include the size of the organization and the high cost to adopt the supply chain practice (Shamsuddin et al., 2017). The organization involves in implementing the green supply chain are mostly the larger manufacturing companies (Lee et al., 2010). According to Abdullah et al. (2016), it is required high cost to implement GSCM as it consists of training, learning, high technology and capabilities. Moreover, the research is about green innovation in Malaysia is still less and slightly debated in this field. This can be indicated that this concept is still in the preliminary stage among the local Malaysian based companies. There are certain barriers that companies need to overcome to implement the concept of GSCM and green innovation.

The capabilities are important for companies to develop this concept of the

manufacturing firms in terms of adopting GSCM and green innovation to expand the source of sustainable economic growths.

However, there are many studies discussed on the issues of adopting GSCM practices in both developing and developed countries but until today there are limited studies conducted on the adoption of GSCM practices and innovation capabilities specifically in the Malaysia context (Seman et al., 2018). The adoption of GSCM practices will be different from one country to another that will be based on certain barriers that they confront in their respective countries such as firm size, suppliers, buyers, communities, customers, legislation, mode of implementation, and different surrounding pressures include of internal and external pressures including the government environmental regulations (Eltayeb et al., 2011; Jabbour et al., 2016; Seman et al., 2018). In the previous studies it showed GSCM practices it has been very advanced in developed countries such as Germany, Japan and other European countries (Scur & Barbosa, 2017). However, in developing countries such as Malaysia, GSCM is considered a new concept in both practice and research (Rao, 2002; Umar et al., 2016).

2.9 Competitive Advantage

2.9.1 The conception

The concept of competitive advantage has been analysed cost against profit where completeness can be viewed in different aspects. Many scholars define competitive advantage from a different perspective but in the end, it has the same objectives. However, (Porter, 1989), defined competitive advantage as the heart of the firm's performance in a competitive market. Besides, Porter identified two generic types of competitive advantage low cost with differentiation advantage or a focus in a successful strategy where the company can obtain competitive advantage through

efficient use of capital and labour and by providing products with lost cost in the industry. On the other hand, the company can create unique features for its products or services through differentiation strategies by using new technologies for customer support (Porter & Linde, 1995). It urged that “competitive advantage grows fundamentally out of value a firm can create for its buyers that exceed the firm’s cost of creating it.” Competitive advantage refers to a superior position in the marketplace that enables a firm to outperform its rivals (Porter, 1985).

Another definition of competitive advantages by Peteraf (1993), as “sustained above-normal returns.” The author defines imperfectly mobile resources as those that are specialized to the organization and notes that such resources where it can be a competitive advantage. Barney (2014), claim that competitive advantage occurred when an organization experience its actions in an industry or market to create value to the economy and when few other organizations or competitors are involved in similar actions. In the final case, the organization is able to gain above the normal performance when it earns and generate more than expected value from the resources it employs.

2.9.2 The Elements of Competitive Advantage

Competitiveness interfaces with the environment in the company’s operations. The awareness of green and the value of the environment is one of the main drivers in the product and services that lead to implementing green supply chain to be the dimension for competitiveness (Tan & Shahrudin, 2016). Publicity has created a demand for the awareness of the environment to be green in terms of products and services (Rao & Holt, 2005). Hence, when investigating the relationship between the practice of environment and economic performance, competitive advantage has to be incorporated with the profitability measurement in the long-term relationship with

efficiency and effectiveness (Laari et al., 2017). This relationship between environmental performance and competitive advantage has a positive impact on economic performance.

The environmental competitiveness has to be concorded with the business performance so the organization can have a wide view of the competitiveness. However, competitiveness at the level of organization aims to the ability of an organization to have better utilization of their resources “efficiency” to reach their aim “effectiveness” as a comparing to other competitors in the market (Dubey et al., 2017). To make a unique product or service compared to other companies in the market (Flynn & Flynn, 1996; Porter, 1989). In this case, the company can apply the implementation of GSCM practice which can be used as a toll to create low cost and diffraction strategies in the supply chain to gain competitiveness among other organizations (Yang et al., 2013). For instance, Sony, Hewlett-Packard, Electrolux and Braun firms reduced their recycling and disposal cost by 35% by developing a common European recycling platform through better collaboration amongst them (Lee et al., 2010). However, cost-saving emerged as the most important factor, followed by the expansion of business opportunities, achieving customer's needs, satisfying the local government or authorities on the region of environmental management system issues and gaining competitive advantage.

Meanwhile, Jia and Wang (2019), point out in overall competitive advantage is significantly appears when a company comprehensive performance is better than other companies. These companies can provide low prices, comprehensive services, high-quality products, environmental improvement, customer satisfaction and/or services in the most reasonable time. The improvement of the capabilities will likely result in improved organization's performance, as such advantages that will assist organizations

to achieve and gain more market share and grow in sales (Ilgin & Gupta, 2010; Toms, 2016). Furthermore, the comprehensive services and delivery time of products will improve the satisfaction of customers and loyalty, and enhance the public image of the firm as well as improve its competitive position in the market (Ma et al., 2017). In short, by following the strategy of GSCM practices, organizations can improve and develop their competitive advantages which will bring superior performance compared to the rivals.

According to Wagner and Schaltegger (2004), applied environmental competitiveness and the overall measure of company competitiveness as the measure of the economic performance in the study meaning the perception of business and to consider how environmental management can influence economic performance. However, it approved the implantation of GSCM it will affect positively the environmental results and company competitive advantage in terms of market opportunities, profitability, employee satisfaction and risk reduction. Further, Yang et al. (2010), in his study he measured the performance of the competitiveness from the dimensions of quality, cost and delivery in connection with customer and supplier management and continues development and improvement. The author holds the view that only cost and quality have a significant relationship towards competitive advantage. Hence, the organization's competitive advantage goes beyond quality products delivered on time. Another possible area of competitiveness study would have been investigated by Rao and Holt (2005), the author measured competitiveness and economic performance through improved quality, productivity, efficiency, and cost savings. The evidence from this study suggests that quality is the basic parameter that has to be met all the way.

In other words, competitive advantage will refer to the superior position in the marketplace that allows the company to overcome its rivals (Porter, 1985). To achieve a competitive advantage, the organization must create greater value that exceeds or equals other competitors in the market (Hart, 1995). Furthermore, organizations must take into consideration the differential between companies along a comparable dimension which enable one company to compete in a greater position than its rivals (Menguc & Ozanne, 2005). Thus, GSCM practices are the source of competitive advantages due to the applied characteristics such as recycling, reuse, remanufacturing, eco-design, green purchase and reverse logistics with less waste and disposal of products. GSCM practice allows firms to differ from other competitors with invisible assets that will create difficulties for rivals to imitate (Wang, 2019). Therefore, the GSCM and competitive advantage is the embodiment of a company's performance where the implementation of GSCM practices will enhance competitive advantage.

Supporting the statement, Jia and Wang (2019), measured the performance of competitive advantages as the generic competitive advantages which indicate quality, price flexibility of products and new product features. The other measurement environmental competitive advantages involved environment harm, environmental risk and environmental governance efforts. Moreover, the implementation of GSCM will improve the core competence of the organization and bring corresponding advantages in terms of price, quality and delivery. The previous study by Tracey et al. (1999), applied seven dimensions for competitive advantage namely: price offered, quality of products, order fill rate, order cycle time, order/shipment information and frequency of delivery. However, based on the above, the selected dimensions for competitive advantage constructs in this study are quality, price/cost and delivery.

2.10 Social Performance

2.10.1 The conception

Several definitions of social performance have been proposed to evaluate the level of organization performance towards society's value. The concept of social performance is driven by the ability of the company to carry the responsibility for the social community stakeholder relationship through Corporate Social Responsibility (CSR) programmes (Fernando & Saththasivam, 2017). The concept first was defined by (Bowen, 1953) while implementing strategies and making decisions towards the organization to take actions to value the society. In the 20th century, a further definition of social performance is given by (Carroll, 1979), who described CSR as the sensitivity of an organization about the stakeholders' expectations on the management of social, economic environmental, ethical and legal issues. Moreover, Wartick and Cochran (1985), evaluate the company social responsibility in three models which are economic responsibility, public responsibility, and social responsiveness.

2.10.2 Social Performance in Manufacturing Industry

Various firms are tending to follow the trend of introducing sustainability in terms of business practices to the operations of the manufacturing process such as waste management, resource efficiency and corporate social responsibility (CSR) programs among other competitors to improve social performance and create competitive advantages (Le, 2020). In the current situation, manufacturing companies are required to comply with social responsibilities and their values where corporate social performance is gaining imperative in strategic management (Distelhorst et al., 2017). The driver's values to adopt social responsibilities are almost certainly due to the increase of stakeholders, government and customers in pressuring companies

surrounding the social impacts of their activities (Davis et al., 2020). Therefore, the significant role of social sustainability towards maintaining corporate sustainability has emerged, and businesses are inevitably sensitive to stakeholders' relations.

The consequences of corporate social performance are not only impacting the society and community such as customers, environment and stakeholders are also leading to various positive impacts to the organization such as the ability to attract talented employees Greening and Turban (1996), improvement in accessing finance, Cheng et al. (2014), improved risk management Koh et al. (2014), and growing in recommendations from stock analysts (Luo et al., 2015). In the global market changes and movements that are playing an important role in recent years which lead organizations around the globe to work on social responsibility and the community has been required to approve the activities businesses carry out (Çankaya & Sezen, 2019). However, social performance abilities, in particular, appeared to acquire significant value to firms to join the global market and be able to compete in the related market.

The waste from manufacturing companies will affect landfills and people. According to the report of the World Health Organization (WHO, 2018) they per cent the latest analysis of worldwide air pollution exposure and health impacts they report that most Global Burden of Disease (GBD) analysis has a significant impact to identify ambient air pollution as one of the most important risk factors contributing to disability and deaths. Household air pollution ranked 8th in the risk factor for early death with 2.6 million people dying around the globe and it is arising from the use of solid fuels (e.g., coal, wood, and dung) for heating and cooking. After deaths caused by using of alcohol, the ambient particulate matter (particulate matter less than or equal to 2.5 micrometres in aerodynamic diameter, or PM_{2.5}) ranked the 6th highest risk factor for early death in the component of air pollution with 4.1 million deaths from air pollution which is

responsible for many diseases such as chronic lung disease, heart disease and stroke and lung cancer (Peden et al., 2016).

Firms have a huge responsibility socially where they need to take care of their employees and society (Tang, 2019). A recent study conducted in Oman by Omar et al. (2019), investigate the relationship between the implementation of GSCM practices, sustainability and environmental uncertainties through corporate social responsibility (CSR) perspective. The study was conducted among 319 firms in the oil and gas sector. According to this study, the implementation of GSCM practices however requires integration among green supply chain partners to achieve sustainable performance. Furthermore, Hussain et al. (2018) confirmed that social performance is measured in terms of increasing health care facilities to the local community.

In the Malaysian context, rapid industrial development and urbanization negatively impacts the environment and pollute the atmosphere (Chin et al., 2019). Following this matter, the Malaysian government is aiming to improve social performance from the outcome of manufacturing companies. To support the previous statement, the Malaysian Federal Government in 2006 allocate RM114 million to rehabilitate rivers, under the “One State One River” program, which is targeted at the most polluted rivers. Therefore, Malaysia spends over RM25 million in the past three years to clean up polluted rivers in the country due to a large amount of garbage and rubbish dumped upstream (Aruna, 2014). However, this kind of serious issue will put the company in a position to follow and apply the required implementation to the society and community to avoid any negative results.

However, the issues of social responsibilities in Malaysia are still in the improvement stage and it is facing difficulties in preventing and reducing the waste

from manufacturing companies which will impact society and their health. As an example of this issue, recent pollution occurred in March 2019 that led to a very negative impact on students and teachers in Johor Bahru in the town of Pasir Gudang and left them hospitalized for more than one week with health issues such as dizziness, breathing difficulties, nausea and vomiting also more than 100 schools were ordered to close as a result. However, the main reason is caused by the chemical waste from “Sungai Kim Kim” river where lorry tanker illegally through chemical waste into the river in the early morning before the victims been ill which is very difficult to clean and remove these chemicals from the river where it has been exposed to rain and wind to start spreading and affect other places (Yap et al., 2019).

The evaluation of social performance is examined in terms of practices such as customer satisfaction, social projects, stakeholder welfare, educational opportunities for all personnel and occupational health and safety of employees (Wang & Dai, 2018). Moreover, consumers are getting more aware regarding the corporate social performance which makes the business owners seeks to consider the responsibilities towards developing social welfare by adopting in the organization certain ethical programs (Omar et al., 2019). Further, Brent and Labuschagne (2004), interpretation overlooks much of the social sustainable performance as the leading factors and achieving the goals to create social welfare for different stakeholders including employee, supplier, society and customer which resulted from the undertaken operational efforts.

In terms of green practices, various studies examined the effect of GSCM on social performance as well as other performances such as economic, financial, operational and environmental (Omar et al., 2019; Qorri et al., 2018; Yang et al., 2018; Zaid et al., 2018). In the other hand, social performance is generally neglected to

compare to other performances in the area of GSCM (Eltayeb et al., 2011; Rajeev et al., 2017). For example, a study conducted in the manufacturing sector by Pinto (2020) in the impact of green supply chain practices on the economic and environmental performance and neglected social performance. However, by trying to enhance the awareness of corporate social responsibilities it will need equal consideration to the other responsibilities to manage the supply chain. In this matter, the green supply chain plays an important role in improving the reputation of the company in the eyes of society, stakeholders, customers, government and personnel (Zaid et al., 2018). Therefore, this positive impact of reputation is very valuable to both customer, loyalty and personal satisfaction. In Conclusion, the successful implementation of green supply chain practices may strengthen firms' relationships with all stakeholders.

2.11 Innovation Capabilities

2.11.1 The conception

According to OECD (2018), the improvement of novelty characteristic of innovation is based on the use and apply new or modified technology. The term of innovation has been defined as technology, stagey or management practice that a firm is implementing for the first time, whether or not other organizations or users have previously adopted it, or as a significant restructuring or improvements in a process (Nord & Tucker, 2019). Another definition by, innovation is defined in various ways: exploring and establishing new ways to produce, supply and distribute, continuous renewing and expansion the product and services range and related markets, the conditions of work and workforce skills and introducing a change in management, organizing work. In general, the production process technology will consist of the use

of tools, material sources and techniques of power to make the production easier than it was and more productive.

However, Mendoza-Silva (2020), defined innovation capabilities as new combination means of production, that is, as a change in the factors of production (inputs) to produce products (outputs) that enable the organization to achieve its expected performance. This process will involve the practical use of application business product or process of technical methods, device, system, practices and skills (OECD, 2018). The knowledge of technological implication applied to transform functional or experiential characteristics of product, service and business process. The capabilities of technology consist of knowledge about these certain technologies and what is the best way to use them involving the ability to advance technologies beyond the state of the art (Lee et al., 2018). Hence, all of this technological assert leads organizations to develop innovation capabilities and encourage corporate entrepreneurship, create a great opportunity of an environment for investment in scientific and technological endeavours, ensure the sustainable growth of corporate entrepreneurship in the competitive market (Rojas et al., 2014).

2.11.2 Antecedents of Innovation Capabilities

In the literature researchers interchangeably use the term eco-innovation (Belin et al., 2011; Hojnik & Ruzzier, 2016; Juniati et al., 2019), green innovation (Chen, 2008; El-Kassar & Singh, 2019; Martínez-Ros & Kunapatarawong, 2019; Roper & Tapinos, 2016; Tariq et al., 2019; Zhu et al., 2017), environmental innovation (Brunnermeier & Cohen, 2003; Marchi, 2012; Oltra & Saint Jean, 2009) and technological innovation (Bhushan et al., 2017; Ryu, 2016; Xu et al., 2019). According to (Lee et al., 2018) in his study on the effect of supply chain management on innovation capabilities in China,

the study findings approve that through proper implementation of SCM practices, firms can achieve better innovation performance in terms of product and process innovation. However, innovation capabilities can play a role in enhancing the performance of the company directly and indirectly. A recent study in Indonesia by Naway and Rahmat (2019), the study uses the integration of innovation capabilities as a mediating role between supply chain capabilities and supply chain operational performance. The evidence from this study suggests that the results of the study could be useful for practitioners, policymakers and operation management.

A previous study by Huber et al. (2007) showed that the use of innovation capabilities in the supply chain will contribute to the unique product identification, the effectiveness of communication, real-time information. Besides, the integration of innovation capabilities in GSCM will assist to track the process of green initiatives practised in the company which leads automatically increase the opportunities and chances to archive the company's goals and objectives to enhance their social performance in the global market. Moreover, Xu et al. (2019), use innovation capabilities as a mediator variable between supply chain and firm performance in China. The study found that innovation capabilities can enhance social performance of manufacturing firms. To achieve future growth in the company, innovation capabilities is specifically described in firms' activities to create new markets as market predictions show these fields will face above-average growth in the next 10 years and these issues will provide various opportunities and potentials in the market (Walz & Eichhammer, 2012).

Additionally, companies considered the activities of innovation as innovation capabilities (Raymond & Bergeron, 2008). Recently, a study conducted by Khan et al. (2022), examined the mediation of innovation capabilities between GSCM and

operational performance in the context of Pakistani manufacturing firms. However, the results of the indicates that innovation capabilities partially mediate the relationship between GSCM practices and operational performance. The findings reveal that innovation capabilities have significance role in mediating the relationship between GSCM practices and firm's competitiveness and performance.

The concept of innovation capabilities can promote the implementation of GSCM by offering new ideas and approaches to manufacturers. This statement is supported by Chen et al. (2006), in his study on the influence of innovation performance on corporate advantage in Taiwan where he claimed that green innovation is having the high opportunity is facilities and increase the implementation of environmental management especially in GSCM to accomplish firm's environmental requirement. According to technology management research, technologists is centrally concerned with the processes of generating new technology and improving upon existing technology. It is believed that innovation continues to process in the time of innovation changes form as it is used and assimilated (Gopalakrishnan & Damanpour, 1997). The study of Kafetzopoulos and Psomas (2015), examined the relationship of innovation capabilities with and company performance in various dimensions of innovation namely: product, process, marketing and organizational innovation. The innovation found that it has a significantly positive influence on operational performance which in return the company can create competitive advantages. Besides, the study suggests that improving the elements of operational performance in the company will lead to improving product quality and consequently makes the products more attractive to customers.

Innovation has a significant role in economic growth. Schumpeter (1934), argued that economic development is driven by innovation through a dynamic process

called “create a distraction” where technologies replace the old process. Moreover, innovation in firms mainly aims to gain a competitive advantage by improving productivity and reducing cost; thus, it is the leading factor for sustaining the value of the business (Cool & Schendel, 1988; Juniati et al., 2019). The organization can enhance its performance through the activities of innovation to develop new products and processes (Armbruster et al., 2008). Additionally, Ryu (2016), holds the view that a service economy environment where many companies concentrate on innovation capabilities as an approach to apply in the traditional manufacturing sector to understand innovation in the organization.

Additionally, considering the innovation capabilities alone is not very sufficient to understand the activities of innovation in the company. Hence, it has been reported that innovation includes technological activities such as introducing and developing new technologies as well as non-technological activities as customer nitration, changing the organizational method, re-establishing business strategies and external network (Armbruster et al., 2008; Ryu, 2016). Many scholars hold the view that innovation capabilities can be measured in different aspects. A recent study conducted in the Brazilian chemical industry by Moori et al. (2018), reported that technical indicators are electricity consumption, water consumption, pollutant emissions and raw material. The study approved that GSCM effect on performance, under influence of the Technology.

Among numerous classifications of types on innovation, one of the commonly accepted by OECD (2005) in the Oslo Manual. Innovation has been distinguished into four types of innovation: process innovation, product innovation, organizational innovation and marketing innovation. Innovation capabilities consists of product innovations and process innovations whereas non-innovation capabilities consist of

marketing innovation and organizational innovations (OECD, 2005). However, based on the previous studies on innovation capabilities, the study will focus on innovation capabilities (product innovation, process innovation, marketing innovation and organizational innovation). The other types were not considered in this study due to the given complexity to the model and it is beyond the scope of this study. In the following sections, more details are provided regarding innovation capabilities.

Over the past three decades, technology systems have undergone a vital role in revolutionary progress that has subsequently influenced every aspect of our daily life. One of the major radical changes towards the shift from computers to the utilization of smart devices where the infrastructure services depend on cloud computing (Menon & Shah, 2019; Wang, 2019). The manufacturing industry in Malaysia has made progress toward adopting the Fourth Industrial Revolution (4IR) in order to maintain its competitiveness in terms of productivity, innovation, and talent while generating the jobs required for long-term growth (MIDA, 2021). The practices in an interoperable global value chain, shared by many companies from many countries (Geissbauer et al., 2016). In this case, the implementation of green supply chain management practices will contribute to the utilization of the technologies which will allow the company to bring connection between machine and human begins in the cyber-physical systems and smart manufacturing.

In the Malaysian context, the industry the Ministry of International Trade and Industry “MITI” from 2019 to 2021 the government is allocating RM 210 million to enhance and assist the transition and migration to Industry 4.0. In order to successfully help the industrial and manufacturing-related services industries' transition into Industry 4.0, the industry 4WRD program was introduced in 2018. Further, the industry 4WRD policy is a national policy that aims to transform the manufacturing sector and related

services within the period from 2018 to 2025 to smart manufacturing and investment in the high technology industry (MITI, 2018). The Malaysian government continue to welcome investors who can contribute in the areas of 4IR-enabling technologies such as artificial intelligence (AI), robotics, virtual reality, big data analytics (BDA), Internet of Things (IoT), and software engineering (MIDA, 2021)

Moreover, in the report carried by the Malaysia Productivity Corporation on the program of Readiness Assessments, the government is aimed to help up to 500 Small Medium Enterprises (SMEs) to move toward Industry 4.0 technologies which is a comprehensive program to assist companies to evaluate their capabilities and readiness to adopt Industry 4.0 processes and technologies. Thus, the program of Readiness Assessment aimed to help organizations in various aspects to develop feasible strategies and plans to perform outcome-based intervention projects, to determine firm's state of readiness in the adoption of Industry 4.0 technologies and to identify the gaps and areas of improvement for Industry 4.0 adoption as well as opportunities for productivity improvement and growth.

Therefore, the introduction of Industry Revolution 4.0 in the manufacturing industries has various impacts on the whole supply chain process which consider revolutionary improvements (Tjahjono et al., 2017). To understand the possible threats and opportunities from this new technological innovation capabilities, companies are required to analyse the impact of IR 4.0 on the supply chain as a whole.

2.12 Underpinning Theories

This study primarily aims to investigate the relationship between GSCM practice, innovation capabilities, competitive advantages and social performance. Also, the study investigates the mediating impact on innovation capabilities in the link between GSCM practice, competitive advantages and social performance. Due to the nature of the variables thus study will apply two underpinning theories that are identified to be suitable to theoretically underline its framework. The following subsections discuss these theories and provide supportive arguments.

To enhance and develop the current research framework, the literature review was carried out with the concentrate on GSCM, competitiveness, innovation capabilities and social performance. Resource-Based View theory (Grant, 1996; Hart, 1995; Porter & Linde, 1995) and Institutional Theory (DiMaggio & Powell, 1983; Hoffman, 2001; Meyer & Rowan, 1977) were selected to build a theoretical foundation for this study. The framework particularly demonstrates a correlation between sound GSCM practices and competitive advantages and social performance.

2.12.1 Theory of Resource-Based View

This research involves the main areas of research, which are green supply chain management practice, innovation capabilities, firm's competitive advantage and social performance. This study is built based on two theories, and one of them is Resource-Based View theory which firm's growth is based on their resources and limited by managerial resources, in which it specifically evaluates their connection to firm's resources at the supply chain and its impact to innovation capabilities, firm's competitive advantages and social performance.

In this sense, the theory of Resource-Based View (NRBV) applied in this study influences and determine the performance of the organization (Hart, 1995). Resource-based view theory was initially proposed by Penrose in 1959 which emphasizes the internal resources of a company where company growth will be based on the company's resources and limited managerial resources (Penrose, 2009). Most frequently used in scientific research to identify and describe the utilization of resources in the company to gain competitive advantages and improve social performance (Shafique et al., 2017). Green practice-oriented enterprises will also be able to differentiate themselves from their competitors at the same time with increased sales gains due to enhanced market legitimacy and greater social approval (Molina-Azorinet al., 2009). As a result, green practices can positively impact firm's competitive advantages through cost advantages, quality products and better delivery comparing to other competitors (Wijethilake, 2017).

Hart (1995) noted that the constraints created by the natural environment such as depletion of resources and degradation of the ecosystem, threaten firms' existing resources and capabilities. The author then tried to expand the scope of the resource-based approach, including the opportunities and limitations inherent in the natural environment. Furthermore, GSCM practices are considered a good way to balance social, environmental, financial and economic advantages (Çankaya & Sezen, 2019). Many scholars view the importance of GSCM to achieve competitive advantages (Green et al., 2012; Rao, 2019; Rao & Holt, 2005; Sarkis et al., 2011). In this view, the resource-based view sees environmental practices as a source of substantial gains to firms to achieve competitive advantage and improve social performance (Hart, 1995).

Resource-based view (RBV) theory confirms that companies make sure the ability of resources to achieve competitive advantage. According to the resource-based

view (RBV), competitive advantage results from the key resources and capabilities of companies (Chang, 2011). NRBV argues that environmental responsibility can become a key capability that leads to enhance innovation capabilities and achieve competitive advantage (Barney, 1991; Hart, 1995). Hence, RBV theory is suggesting that organization's internal resources and capabilities it has to be the foundation strategy for the organization that's are based upon as they are the main resources of profit and growth in a segment of the industry, and competitive advantage is driven from these resources and capabilities (Grant, 1996). In the other hand, GSCM practices is leading innovation capabilities to be enhances which will result to achieve competitive and improve social performance.

Porter (1980), also identified competitive strategy in five industry forces that the threat of new entrants, the intensity of industry rivalry, the bargaining power of suppliers, the threat of substitutes and the bargaining power of customers. However, these forces are the way of organizations to choose, enhance and develop the competitive position which will lead to creating major important difficulties for other competitors to imitate, which could have resulted in a long-term or sustainable competitive advantage (Porter, 1989). Besides, when firms are aware of their resources and capabilities, they will be able to recognize and differentiate their strengths and weakness. Also, when firms know their capabilities, it will assist them to make better strategies to win competitive advantage (Fikru, 2016; Rivard et al., 2006).

Green practices can develop innovation capabilities and positively influence the performance of a firm's sustainability by minimizing the consumption of energy and use of materials, improving the engagement of stakeholders, increasing the quality of product and reducing costs of production. Moreover, Hart's typology believed firms can gain competitive advantages by applying strategies and methods such as pollution

prevention, product stewardship and sustainable development. In this view, NRBV is supporting the statement that GSCM can be considered as a source of strategies that will develop the firm's performance. This will be due to GSCM practices that are a difficult source of limitation by other competitors as they are based on knowledge and experience. For instance, the influence of GSCM leads to having a positive reputation which is not a source resource that can easily be imitated by other rivals in the market (Wijethilake, 2017).

2.12.2 Institutional Theory

Another theory that may be utilized to explain the impact of GSCM is the institutional theory. Since the industrial revolution and up to a certain period, businesses had heavily focused only on profit-related activities. However, increased competition, damaged environment and increased importance paid to quality of life led social responsibility to gain importance. As social responsibility gained importance, the concept of the stakeholder has directly come to the forefront.

DiMaggio and Powell (1983), and Hoffman (2001), recommend various drivers to adopt green supply chain management initiatives and practices that reflect the pressure of stakeholders such as the community, government, investors, suppliers, customers, and employees. The culture in the organization and its moral desire to do the right thing also encourage companies to adopt these initiatives (Carter & Jennings, 2002). In this case, the institutional theory is offering an overarching these as to how firms respond to institutional pressure in the perspective of the environment (Meyer & Rowan, 1977). However, this theory will confirm the influence of external institutions on an organization's strategies (Chen et al., 2012). It emphasizes that the social objectives of the organization are in not all the time to maximize their profit, and their

activities often meet external pressures for legitimacy also strive to achieve social legitimacy. It is also to obtain the trust of external institutions.

The drivers of GSCM practices are the motivators that encourage business organizations to adopt GSCM practices. According to institutional theory, two primary mechanisms influence the behaviour of organizations: imposition and inducement (Scott, 1987). These mechanisms are enacted through regulatory institutions and other organizations that constrain the organization and direct its behavior (Oliver, 1991). When enacted as laws, the constraints force firms to make necessary changes in their structure and processes because they would avoid the potential costs, uncertainty, and legal liabilities for noncompliance (Clemens and Douglas, 2006; DiMaggio and Powell, 1983). Alternatively, an agency can provide incentives to organizations to induce them to act in a desirable manner (Grewal and Dharwadkar, 2002).

Hence, firms are required to implement green practices in their production and adopt innovation capabilities to create competitive advantage and improve social performance. Scott (1995) stated that firms can obtain legitimacy through ensuring the congruency of their behaviours with social norms, values and expectations. Recently, firms are growing their implementation of suitable operations, involving innovation capabilities to enhance legitimacy (Lee et al., 2018; Roper & Tapinos, 2016; Yam et al., 2011; Yao et al., 2019). However, the establishment of environmental regulations can trigger green innovation that will fully or partially impact the cost of complying with these regulations and create competitive advantages for the green innovators (Porter & Linde, 1995; Yao et al., 2019).

Institutional theory is the external forces to avoid doing specific or make something by external environment competitors, suppliers, customers, government and regulatory bodies which are the main players to insert pressure on firms. The

institutional pressure is reflecting pressure expectations, and restrictions of these bodies towards firms (Fikru, 2016). This pressure will lead to three strategic isomorphisms – coercive, mimetic and normative to formulate the values, norms and rules in the institutional environment. Besides, these isomorphisms are one of the institutional environments, which aimed to assist firms to build or choosing effective strategies to gain competitive advantage (Shafique et al., 2017). However, these set of strategies or individual strategies are formulated by regulatory bodies to set their benchmarks to achieve the highest standards, which aimed to achieve better firm's social performance (Weerakkody et al., 2016).

Traditional supply chain management mainly concentrates on delivering products from suppliers to customers regardless of the consideration of society. The traditional SCM also is not aiming to focus on the environment which leads to having a negative impact on environmental pollution and social health issues. In many countries, this pollution became a very serious issue (Mathivathanan et al., 2018). The main causes of this pollution are outdated manufacturing companies and the consumption of the produced products. This negative impact will lead to damage to society and become the cause of many diseases and deaths for humans and animals. In this case, the institutional theory will represent the implementation of GSCM practice in manufacturing companies to reduce the negative impact on the environment and society which will lead to gaining competitive advantages and improve social performance (Lee et al., 2017; Luthra et al., 2016) Furthermore, the business sector has to take into consideration to involve their business into the green practices in manufacturing and service industry with sustainability and to mitigate the end-to-end supply chain cost to achieve competitive advantages and enhance social performance.

2.13 Hypotheses Development

2.13.1 Relationship Between Green Supply Chain Management Practices and the firm's Competitive Advantage.

In the current business, environmental and social issues have become one of the important attentions with the increasing of competition and the demand for stakeholders (Younis et al., 2019). Nowadays, many businesses are concerned about the aspects of the environment as various business activities is eligible to contribute to the threat to the environment. The aspects of incorporating environmental in the operation of business assist the organization to create long terms values significant for sustainability performance. The manufacturing sector in Malaysia is one of the main contributors to the country's pollution index (Hassan, 2016). As a result, GSCM practices is one of the prevalent strategies in this sector to manage the issues of the environment for the effectiveness of their production and competitiveness. Furthermore, it has been highlighted by the Malaysian Economic Transformation Programme (ETP) the green technology development in the effort to achieve from developing nation to developed nation statues (Rasit et al., 2019).

However, several current studies showed that GSCM practices have a positive impact on the performance of the organization and its competitiveness (Jabbour et al., 2016; Kafa et al., 2013; Luthra et al., 2016; Mitra & Datta, 2014; Qorri et al., 2018; Rasit et al., 2019; Seman et al., 2018; Shamsuddin et al., 2017; Tramarico et al., 2017; Mahmood et al., 2012; Younis et al., 2019; Zhu, et al., 2008). According to Qorri et al. (2018) GSCM practices are initiatives that organizations implement to comply with the environmental legislation to reduce the damage to their operations which will assist the company to improve performance in the supply chain. GSCM practices include compulsory and vulnerable initiatives that need to incorporate both inter-organizational

and internal practices. These practices require major manufacturers to work with suppliers and consumers to enable the company to compete in the market (Mitra & Datta, 2014).

Additionally, Tan (2016), studied the relationship between GSCM and competitive advantages among 144 manufacturing firms in Malaysia. The study examines the effects of GSCM practices under the dimension of green purchasing, green production, and investment recovery on the firm's competitiveness. Based on the result of the study reveals that firm competitiveness could be affected by green purchasing and green production. On the other hand, the third practice investment recovery has no relationship with firm competitiveness that will be due to the high cost of monetary reaction and implementing the overall framework. The results reported here appear to support the assumption that a firm's competitiveness will be greater that is driven by a higher level of green purchasing practices and green production practices. In the same vein, organizations that implement the practice of green purchasing will confirm the balancing among cost/price and delivery concepts in the purchasing activities. Moreover, the evaluation of a supplier section will be based on the criteria of green purchasing to make sure all materials that company purchased are containing green attributes and this will comprise added advantages for the organization towards international competitiveness.

A study conducted by Shafique et al. (2017), examined the impact of GSCM practice on firm's performance in the electronics industry in Pakistan with 500 questionnaires that were distributed. The result of the study is that green supply chain management practices are positively affecting organizational performance which has been proved and accepted. However, the study will support the hypotheses of this on the relationship between green supply chain management practices and organizational

performance. Furthermore, the study suggests that implementing GSCM practices can enable the organization to gain competitive advantages in the market. Previous studies support the evidence that GSCM practices and organization performance are positively related to each other. For example, Çankaya and Sezen (2019), the researchers focused on the relationship between GSCM practices and the relationship towards environmental, economic and social performance which are the three dimensions of corporate sustainability and performance to gain competitive advantages. A total of 181 manufacturing firms in Turkey were conducted in the study that approved all GSCM practices except green purchasing supported and related with at least one of the performance dimensions.

In the Malaysian context, previous research has confirmed the existence of the relationship between GSCM, organization performance and environmental sustainability to gain competitive advantages. Likewise, Eltayeb and Zailani (2014), studied green purchasing, eco-design, and reverse logistics were studied as dimensions of GSCM. The study conducted among 569 manufacturing companies in Malaysia certified under ISO 14001 found that GSCM practices can play a significant role in achieving the “triple bottom line” of environmental, social and economic benefits and, therefore, contributing to sustainable development and organizational performance. Another previous study carried out by Yang et al. (2013) found out a green supply chain influence a firm’s competitive advantage. The study used green performance as a mediator between both variables. The participants of the study included 164 container shipping firms in Taiwan. The study applied green performance and external green collaboration as a mediator between green practice and firm competitiveness.

Companies are adopting various GSCM strategies to gain a competitive advantage. A recent study supports the previous statement by Sadurdeen and Sutha

(2019), conducted a study aimed to identify the impact of GSCM on competitive advantage. The study was carried out among 30 firms that were following green practices in Sri Lanka. The results of the study indicate that there is a strong positive relationship between GSCM and competitive advantage. Another recent empirical study conducted by Jia and Wang (2019), the study endeavour to contribute to the growing research on the strategies of GSCM by relying on the theory of Porter competitive advantage. The study examines the relationship between GSCM practices and their influence on competitive advantage and firm performance in China. The dimensions of GSCM practices were green manufacturing, green marketing, green procurement, green logistics green recycling. The study identified competitive advantage into two elements generic competitive advantage and environmental competitive advantage. The result of the study show GSCM is positively correlated to competitive advantages non-finance performance. Moreover, the study indicates that generic competitive advantage is better than the environmental competitive advantage in terms of performance in the company.

Table 2.3: Summary of studies investigating the relationship between GSCM practice and competitive advantage performance

No	Author (Year)	Sample
1	(Zhu et al., 2010)	Manufacturing companies – Japan
2	(Martusa, 2013)	Manufacturing firms – Indonesia
3	(C. S. Yang et al., 2013)	Container shipping firm - Taiwan
4	(Eltayeb & Zailani, 2014)	ISO 14001 certified manufacturing firms - Malaysia
5	(Tan & Shahrudin, 2016)	ISO 14001 certified companies - Malaysia
9	(Jabbour et al., 2016)	Industrial companies – Brazil
7	(Hyland & Gieskes, 2017)	Small, Medium and Large-sized organizations - India

8	(Vanalle et al., 2017)	Manufacturing companies - United Kingdom
9	(Zhu et al., 2017)	ISO 14001 Manufacturing companies – China
10	(Scur & Barbosa, 2017)	ISO 14001 certified and non-certified home appliance manufacturers - Brazil
11	(Shafique et al., 2017)	Electronics industry – Pakistan
12	(Kumar et al., 2018)	Manufacturing firms – United Kingdom
13	(Qorri et al., 2018)	Manufacturing firms – United States
14	(Mohamad et al., 2018)	ISO 14001 certified companies - Malaysia
15	(Feng et al., 2018)	Automobile manufacturers - China
16	(Jia & Wang, 2019)	Manufacturing companies - China
17	(Rasit et al., 2019)	ISO 14001 certified manufacturing firms - Malaysia
18	(Çankaya & Sezen, 2019)	Manufacturing firms - Turkey

In light of the above discussion, much evidence proved a positive and significant relationship between GSCM practice and competitive advantage performance in various countries and sectors. However, there is a lack of evidence about the relationship between GSCM and competitive advantages performance in the Malaysian context. Based on the rationale above, this study proposed the following hypotheses:

Hypothesis 1: There is a positive effect of green supply chain management practices on a firm's competitive advantages.

2.13.2 Relationship Between Green Supply Chain Management Practices and Social Performance.

In the last few years, manufacturing companies are aiming to draw their attention to the social responsibilities in the supply chain activities and this will be due to the increased government, customers and stakeholders' pressures as well as the awareness on training and education, health and safety of employees and social projects (Geng et al., 2017). In this matter, green practices are playing an important role in

strategy which allow the company to concentrate on reducing the harm to society and improving the social outcome. Currently, Le (2020) conducted a study of 218 construction materials manufacturers in Vietnam. The study examined the relationship between GSCM practices and sustainable performance namely economic, environmental and social performance. The findings of the study that green design and green manufacturing had positive and significant effects on social performance. The study indicates that manufacturing companies with great attention and consideration on social responsibilities will improve their image among customers and stakeholders.

Social performance is also reflected in terms of improving the opportunities of business and employment to the community (Das, 2018). In this case, Ahmadi et al. (2017), indicated that a sustainable firm needs to take the environmental economic and social dimensions of sustainability into account. The researcher conducted a study among 38 experts from different industries as drivers as electric and electronic, automotive, telecom, chemical, motorcycle, cement and tile manufacturing companies with over 10 years of working experience. The study aimed to address some real issues that impact society negatively from the manufacturing industries in the organizational supply chain operations, specifically in the developing countries where social sustainability is gaining less attention. The results of the study will assist business owners, managers and decision-makers to decide where they need to concentrate their attention during the stage of implantation to increase the social sustainability in the firm's supply chain.

With the growing concern and awareness of the public to social issues, many authors view that social factors are important in achieving green or sustainable supply chain practices (Sarkis et al., 2011; Yu et al., 2018; Zhu et al., 2012). The social

performance will enable the company to maintain the quality standards of life of people preferably without damaging the environment and over-exploitation of the natural resources need to be researched. However, sustainability in GSCM practices has been recognized as an imperative issue for environmental and social benefits. This statement is supported by (Luthra et al., 2016) in their study on the critical success factors to implement GSCM towards sustainability among 123 Indian automobile organizations. The study findings approve that successful implementation of GSCM practices is playing a crucial role in the achievement of expected performance outcomes.

In the Malaysian context, Fernando and Saththasivam (2017), investigated the relationship between green supply chain agility, environmental and social performance among 230 firms representing various industries that are part of EMS ISO 14001 certified manufacturing firms in Malaysia. The results of the study indicate that green supply chain agility will improve the social and environmental performance of the company. However, we can understand that firms who pay attention to social responsibilities will be able to improve their public image to stakeholders, customers and government.

Social performances make an improvement and maintenance of a quality standard of life of people preferably without damaging the environment and over-exploitation of the natural resources need to be researched (Yusuf et al., 2013). The sustainability in GSCM practices has been recognized as an imperative issue for environmental and social benefits (Carter and Rogers, 2008; Hutchins and Sutherland, 2008; Govindan, 2015, 2015; Mangla et al., 2015, 2015). Further, the social performance outcomes include a reduction in environmental risks, contribution to environmental protection and corporate image improvement.

Table 2.4: Summary of studies investigating the relationship between GSCM practice and social performance

No	Author (Year)	Sample
1	(Fernando & Saththasivam, 2017)	ISO 14001 certified manufacturing firms – Malaysia
2	(Luthra et al., 2016)	Automobile organizations - India
3	(Badri Ahmadi et al., 2017)	Manufacturing industry – Iran
4	(Zaid et al., 2018)	Manufacturing companies - Palestine
5	(Younis et al., 2019)	ISO14001 certified manufacturing companies – United Arab Emirates
6	(Omar et al., 2019)	Oil and gas sector - Oman
7	(Le, 2020)	Construction materials manufacturers - Vietnam

In light of the above discussion, several studies found a positive and significant relationship between GSCM practices and social performance. However, the evidence is lacking on the relationship between GSCM practices and the firm's social responsibilities and social performance within manufacturing in Malaysia. Based on the rationale above, this study proposed the following hypothesis:

Hypothesis 2: There is a positive effect of green supply chain management practices on a firm's social performance.

2.13.3 Relationship Between Green Supply Chain Management Practices and Innovation Capabilities.

The consideration of innovation capabilities becomes a very hot topic to debate the issue in both academic and practical (Asadi et al., 2020; Lin et al., 2019; Tariq et al., 2019; Yang & Roh, 2019; Yao et al., 2019). Innovation is playing a significant role as a tool to improve and enhance the performance of environmental management which will allow the company to satisfy the requirement of regulations of environmental protection (Lai et al., 2003; Lin et al., 2019). However, the implementation of GSCM

practices will enhance the innovation capabilities in the company which leads to improving the overall performance of the firm.

In this study, innovation capabilities will be defined as new combination means of production, that is, as a change in the factors of production inputs to produce products outputs that enable the organization to achieve their expected performance. This process will involve the practical use of application business product or process of technical methods, device, system, practices and skills (OECD, 2018). This study investigates the relationship between GSCM practices and innovation capabilities by the implementation of GSCM practices which will lead to reducing the negative impact on the environment and making differentiation of developed products among competitors. These innovations will involve innovations that include product innovation, process innovation marketing innovation and organizational innovation (Camisón & Villar-López, 2014; Lee et al., 2018; OECD, 2018). However, innovation is a result in the lessening of ineffectiveness and natural sustainability resources, establishing the main source of cost reduction (Calza et al., 2017). On the other hand, companies are forced to consider the increase of human consumption and raise the awareness among them of the environmental impact of consumer choice, the environmental attributes of new products and services which can be used for marketing differentiation (Ma et al., 2017; Orsato, 2006; Porter & Linde, 1995).

Several studies analysed the link between GSCM, technology and innovation and their influence on competitiveness and the improvement of performance. Role of technology in the performance of the company in the Brazilian chemical industry (Yang & Roh, 2019). As a result, technology and innovation seem to point to more conscious and productive management that aims also to balance the costs needed to make the organization environmentally friendly. This consequence can be achieved through the

approach of innovation to business and resource management. (Cosimato & Troisi, 2014). Similarly, Umar et al. (2016), in manufacturing small and medium enterprises in Nigeria. The study found that Overall GSCM has a substantive and significant influence on innovation capabilities.

The growing importance of innovation capabilities is becoming a promising area in the GSCM in which firms can eliminate the indirect and direct organizational and environmental impact of an organization's final product. Few studies explored the relationship between GSCM practice and green innovation. According to (Seman et al., 2018) conducted a study among 123 responses from Malaysian manufacturing firms on the relationship between GSCM and innovation in a green concept. The author discussed the linkage between GSCM and innovation where several empirical studies that described the literature implied GSCM has a significant relationship on green innovation, but few studies grab the attention on this relationship cannot boost better understanding for academic and practitioners. The findings of this paper show that GSCM leads to innovation.

A recent study conducted by Yang et al. (2019), examines the relationship between GSCM and innovation capability with information and communication technologies among 214 manager training centres in China. The results of the study found that GSCM has a direct role it plays in technology innovation to enhance operational efficiency and reduce environmental footprint through different activities. However, the study suggests that informal alignment constitutes more of a necessary condition for the technology aspect but more of a sufficient condition for the task aspect of digital innovation. Likewise, the study indicates that GSCM practices lead to smoother digital innovation as the management side of organizational innovation will set the tone for the technology side.

Table 2.5: Summary of studies investigating the relationship between GSCM practice and innovation capabilities

No	Author (Year)	Sample
1	(Chiou et al., 2011)	Eight industry sectors – Taiwan
2	(Seman et al., 2012)	Conceptual study – Malaysia
3	(Seman et al., 2012))	Manufacturing Industries – Malaysia
4	(Alhadid & Abu-Rumman, 2014)	managerial employees and the middle managerial employees – Jordan
5	(Zailani et al., 2015)	Automotive supply chain industry – Malaysia
6	(Umar et al., 2016)	Manufacturing small and medium enterprises - Nigeria
7	(Shafique et al., 2017)	Electronics industry – Pakistan
8	(Seman et al., 2018)	ISO 14001 certified manufacturing companies - Malaysia
9	(Pinto et al., 2019)	Firms practice GSCM - Brazil
10	(Z. Yang et al., 2019)	Manager training centre - China

Based on the discussion above, various studies ascertained the vital role of GSCM practice in facilitating innovation capabilities in organizations. Based on these findings, the following hypotheses were postulated:

Hypothesis 3: There is a positive effect of GSCM practices on innovation capabilities.

2.13.4 Relationship Between Innovation Capabilities and Firm's Competitive Advantages.

Many scholars hold the view that manufacturing companies can improve their competitive performance and productivity through innovation capabilities (Kafetzopoulos & Psomas, 2015; Wang et al., 2019; Yam et al., 2011). The role of innovation capabilities in an organization is to determine its performance and its survival or extinction (Wang et al., 2019). Trott (2008), also stated that innovation plays a major role in growth. However, manufacturing firms can implement differentiation in

product innovation and minimize the cost of manufacturing and shorten production through process innovation (Naway & Rahmat, 2019).

A previous study conducted by Powell and Dent-Micallee (1997), investigated the relationship between information technology and firm performance among the retail industry in the USA. The study aimed to explain the practice of technology will enhance the performance of the company. The findings of the study approve that company can gain competitive advantages through integrations of technology in the company. Similarly, Gunasekaran et al. (2017), in the systematic review on the use of technology in the production process to gain competitive advantage. The study confirms that information technology contributed to competitive advantage in numerous benefits such as increased efficiency and responsiveness.

In the last few decades, a great number of scholars argued on the fact of static and traditional technology is no longer meeting the requirements of a company's growth in competition and sustainable development among rivals (Cheng & Chen, 2013; Stock et al., 2002). The lack of effective technology innovation will lead to a low contribution to the firm and market failures in practice (Wang et al., 2019). This can be illustrated briefly by the example of Kodak when they are famously known as the biggest cameras and films manufacture, but they missed the chance of digital transformation due to the lack of effective and dynamic technology capability which in 2012 Kodak declare bankruptcy, the same goes to Nokia when they didn't follow the transformation and technology advancement to external market demand in terms of touch screen smartphones (Wang et al., 2019).

According to Distanont and Khongmalai (2018), reported that leaders of companies need to adapt and be ready to face the economic changes and technological advancement in the global, regional and regional market. Moreover, innovation

capability is a significant weapon that can be implemented to develop and strengthen a business to achieve a competitive advantage to or greater than those of international businesses and hereby realize sustainable economic development. The study was conducted among 279 SMEs frozen food industry in Thailand. The study examined the innovation that leads to a competitive advantage. The findings of the study show that entrepreneurs in SMEs are required to adopt the changes in technology advancement and upcoming economic changes which is occurring in the global world. Moreover, innovation in terms of technology becomes the strategic tool in the aggressive competition for creation, enhancement and improvement of business companies to create competitive advantages equal to or better than those in other countries to realize sustainable development.

Another study conducted by Kafetzopoulos and Psomas (2015), on the relationship between innovation capability on the performance of manufacturing companies. The data of the study were collected from 233 Greek manufacturing firms. The study analysis innovation capabilities with four dimensions namely (product, process, marketing and organizational innovation). The findings of the study show that innovation capabilities directly contribute to the performance of the company to achieve competitive advantages in terms of product quality and operational performance. In contrast, the study clarifies that the capabilities of manufacturing firms are coming from the technology innovation that should be taken into consideration to explain its contribution to competitive advantages.

Nuryakin (2018) studied the role of innovation in achieving competitive advantages. The study was conducted among 163 batiks SMEs in Central Java province in Indonesia. This research aims to investigate the influence of technology innovation in particular product innovation on the performance of the firm to gain competitive

advantages. The results of the study showed that Product innovation significantly affects competitive advantage. The innovation of products could create developed products through the adoption of technological application within new design and, new ideas of technological advancement and implementation of new technological innovation capabilities.

In the highly growing competitive environment, each organization aims to defeat the competition and win the attention of customers. Moreover, individuals with knowledge represent a significant tool for the upcoming generation on innovation capabilities and that will be based on their creativity, knowledge, skills and abilities it is possible to create new innovative ideas that will assist companies to gain a competitive advantage (Juniati et al., 2019). In this matter a study conducted in the Republic of Czech by Urbancova (2013) on the competitive advantage achievement through innovation and knowledge. The data of the study was gathered from 109 organizations. The study found that companies find it important to innovate and support an innovative culture to achieve competitive advantages.

Table 2.6: Summary of studies investigating the relationship between innovation capabilities and competitive advantage performance.

No	Author (Year)	Sample
1	(Powell & Dent -Micallee, 1997)	Retail industry - USA
2	(Urbancova, 2013)	Random quota organisations - Czech Republic
3	(Kafetzopoulos & Psomas, 2015)	Manufacturing firms - Greece
4	(Gunasekaran et al., 2017)	Systematic review – United Kingdom
5	(Bhushan et al., 2017)	Multi brand retails - India
6	(Distanont & Khongmalai, 2018)	SMEs frozen food industry - Thailand
7	(Nuryakin, 2018)	Batik SMEs – Indonesia
8	(Xue et al., 2019)	Manufacturing firms - China

In light of the above discussion, several studies found a positive and significant relationship between innovation capabilities and competitive advantage. However, the evidence is lacking on the role of innovation capabilities to gain competitive advantages in the context of Malaysian manufacturing companies. Based on the rationale above, this study proposed the following hypothesis:

Hypothesis 4: There is a positive effect of innovation capabilities on the firm's competitive advantages.

2.13.5 Relationship Between Innovation Capabilities and Social Performance.

Innovation is defined in various calcifications in the organization. Szeto (2000) identified innovation as the continuous improvement for the overall capabilities of organizations to create and gain innovation to develop new products and services to meet the needs of the market. However, innovative companies tend to increase their social responsibilities more than their less innovative rivals (Broadstock et al., 2019). Therefore, increasing the social responsibilities in the organization without some innovation will lead the organization to face difficulties to be socially responsible where innovation capabilities will increase the creativity and efficiency in the company.

The research data on innovation capabilities can assist policymakers to understand social and economic changes and help them to the contribution (positive or negative) of innovation to social and economic goals, as well as following up with the evaluation of effectiveness and efficiency of their policies. A significant study conducted in China by Feng et al. (2019), examined the effect of innovation on economic, social and political performance by using combined data of 596,809 Chinese manufacturing firms with 1,993,154 observations and provincial globalization indices from 1998 to 2009. The findings of the study indicated that the greater the innovation

practices the better the social performance in the company where companies should continue to enhance their innovation capabilities to create better performance in the social responsibility aspects.

Innovation will continue to grow the attention to answer certain questions on how firms can improve their social and environmental performance. Therefore, innovation capabilities in generating new products and services will replace harmful markets and increase the image of the company in the new markets and gain more profit (Xie et al., 2019). However, Kennedy et al. (2017), examined the relationship between innovation and sustainability performance of the company. The data of the study was gathered by interviews of 19 chief technology officers, R&D Directors and CEOs. The findings of the study indicate that effective innovations in the company will bring improvement in the firm's social and environmental performance.

Schumpeter (1934), claimed that innovation is taking part in corporate strategy and is recognized as one of the great potentials for a firm's source of sustained growth in the market by making changes in products, processes, business models and/or organizational structures. However, Delgado-Verde et al. (2016), inspected the relationship between innovation and firms' performance. The study was carried out in Spanish high and medium high-tech manufacturing firms with 215 surveys collected. The findings of the study confirm that innovation has a positive relationship to company social performance which create a better reputation of the company to the social and economic.

According to OECD (2018), states that innovation is central which allow people to improve their standards which also affect institutions, entire economic sectors, even individuals and entire countries in multiple ways. Moreover, sustainability is not coming by itself, it needs a great amount of effort of resources and capabilities. likewise,

Zhang et al. (2019), explored the influence of management innovation and innovation capabilities on organization performance. The data was gathered from 304 Pakistani CEOs and top managers. The results indicate that management innovation and innovation capabilities significantly positively contribute to sustainability and organization performance. Furthermore, the study recommends CEOs and top managers give due attention to management innovation and innovation capabilities to enhance sustainability and survive the long run.

Table 2.7: Summary of studies investigating the relationship between innovation capabilities and a firm's social performance.

No	Author (Year)	Sample
1	(Delgado-Verde et al., 2016)	High and medium high-tech manufacturing firms – Spain
2	(Rothenberg et al., 2017)	Environmental, social and governance factors (ESG) database – United State
3	(Kennedy et al., 2017)	chief technology officer, R&D Director and CEOs – Netherland
4	(Feng et al., 2019)	Manufacturing firms - China
5	(Zhang et al., 2019)	CEOs and top managers – Pakistan
6	(Latan et al., 2020)	manufacturing companies with ISO 9001 certification – Indonesia

Based on the discussion above, several studies found a positive and significant relationship between innovation capabilities on a firm's social performance. However, the evidence is lacking on the role of innovation capabilities to improve the social performance in the manufacturing sector in Malaysian. Based on these findings, the following hypotheses were postulated:

Hypothesis 5: There is a positive effect of innovation capabilities on the firm's social performance.

2.13.6 The Mediating Role of Innovation Capabilities.

Innovation capabilities will identify the performance of the company and its survival or extinction in the market (Verbano & Crema, 2016). It's also stated that innovation capabilities has been used as a tool in engaging growth where manufacturing companies are highly considering the implementation of minimizing manufacturing costs and shortening production cycle by process innovation and product differentiation strategy by product innovation (Chen et al., 2015).

Referring to the previous studies that have confirmed the existence of the relationship between GSCM practices and innovation capabilities, (Chiou et al., 2011; Pinto et al., 2019; Seman et al., 2012, 2018; Yang et al., 2019; Zailani et al., 2015). For example, Shafique et al. (2017), found that GSCM practices will lead to having a positive impact on various aspects of innovation capabilities in the company by implementing new strategies and technologies in the company to reduce the negative impact to the environment and increase company performance in various aspect as well. Similarly, Seman et al. (2012), found that GSCM practices have a positive influence on green innovation. Moreover, if the organization can involve innovation with its supply chain it will enhance the absorptive capacity of the company, thus allowing the company to introduce new products and services (Lee et al., 2018). Indeed, innovation is a fundamental pillar of building competitiveness in the global arena.

On the other hand, many studies have confirmed the positive relationship between innovation capabilities and competitive advantages (Distanont & Khongmalai, 2018; Gunasekaran et al., 2017; Kafetzopoulos & Psomas, 2015; Powell & Dent - Micallée, 1997; Urbancova, 2013). For example, Xue et al. (2019), reported that innovation can provide a monumental opportunity for a firm's growth, including enhanced performance and sustainability that can lead to competitive advantages in the

market arena. Further, a study conducted by Nuryakin (2018), demonstrated that innovation capabilities positively affects competitive advantages. (Bhushan et al., 2017), argued that many organizations are adopting innovative technologies as well as green solutions to make the supply chain more efficient and create competitive advantages to the organization in the global market.

The European Commission (1996), defined innovation in different aspects. First, innovation is considered as continuous expansion and renewing the range of the product and process and related market. Second, innovation is allowing companies to establish and explore many new ways to produce, supply and distribute. Third, innovation can play a role in introducing a change in the conditions of work and workforce skills, organizing work and management. In this matter, Kaufman et al. (2000), believed that companies can improve their ability to be involved in product innovation and process innovation, provided they carefully manage their relationship with both suppliers and customers. Likewise, customers are one of the main influencers followed by trade exhibitions, the research and development department and the company management in terms of the new product idea.

Based on the previous evidence, there is a possibility that innovation capabilities could have a role as a mediator in the relationship between GSCM practice and competitive advantages. Such relationship can be explained through Resource-Based View theory (Grant, 1996; Hart, 1995; Porter & Linde, 1995) and Institutional Theory (DiMaggio & Powell, 1983; Hoffman, 2001; Meyer & Rowan, 1977). In other words, innovation capabilities play a significant role in improving the company's performance and productivity through various innovation dimensions to achieve competitive advantages in the global market (Agrawal & Narain, 2018). Therefore, this study argues

that innovation capabilities will mediate the effects of GSCM practice and competitive advantages.

Furthermore, Camisón and López (2010), examined the mediation role of innovation capabilities in the relationship between manufacturing flexibility and performance. The dimensions of innovation capabilities were product, process, and organizational. The study collects survey data from 150 Spanish firms. The findings of the study show that innovation capabilities effect on organizational performance of adopting a flexible production system is mediated by the dimensions of incorporating product, process, and organizational innovation. The study address to close the gap in the research by examining the importance of innovative capabilities.

Meanwhile, Moori et al. (2018), discussed the mediating effects of technology and innovation on the relationship between GSCM and the company's performance to lead the company to competitiveness in the chemical industry market. The data was gathered from 160 Brazilian chemical companies. The findings of the study confirm that technology partially mediates the relationship between GSCM and environmental performance. There was evidence that technologies provide tangible competitive advantages, although several of them in the long term could be achieved. A similar study conducted by Naway and Rahmat (2019), the study applied the integration of technology as a mediating role between supply chain capabilities and supply chain operational performance. The evidence from this study suggests that the results of the study could be useful for practitioners, policymakers and operation management.

Based on the previous argument, this study posits that innovation capabilities will be a mediator in the relationship between GSCM practice and competitive advantage. Consequently, this study proposes the following research hypotheses:

Hypothesis 6: There is a mediating effect of innovation capabilities in the relationship between GSCM practice and competitive advantage.

Hypothesis 7: There is a mediating effect of innovation capabilities in the relationship between GSCM practice and social performance.

2.14 Conceptual Framework

Figure 2.7, illustrates the model's four main variables: (i) GSCM practice, (ii) innovation capabilities, (iii) competitive advantage, and (iv) social performance. This framework highlighted that managers are decision-makers who have the responsibility to create a fair atmosphere for implementing green practices to enhance their innovation capabilities and achieve competitive advantages and improve social performance. Furthermore, this framework has to seize the advantage by focusing on the outcomes of innovation capabilities elements, which will lead an organization to fulfil the expectations and requirements of the suppliers, government and customers. Additionally, the research framework of the study also explains the impact of GSCM practices on innovation capabilities and a firm's competitive advantage and social performance.

However, based on the previous discussion in this chapter, there are seven hypotheses proposed by the study as detailed below:

- H1. There is a positive effect of green supply chain management practices on a firm's competitive advantages.
- H2. There is a positive effect of green supply chain management practices on a firm's social performance.
- H3. There is a positive effect of GSCM practices on innovation capabilities.
- H4. There is a positive effect of innovation capabilities on the firm's competitive advantages.

- H5. There is a positive effect of innovation capabilities on the firm's social performance.
- H6. There is a mediating effect of innovation capabilities in the relationship between GSCM practice and competitive advantage.
- H7. There is a mediating effect of innovation capabilities in the relationship between GSCM practice and social performance.

The hypotheses of the current study can be illustrated in Figure 2.8 below:

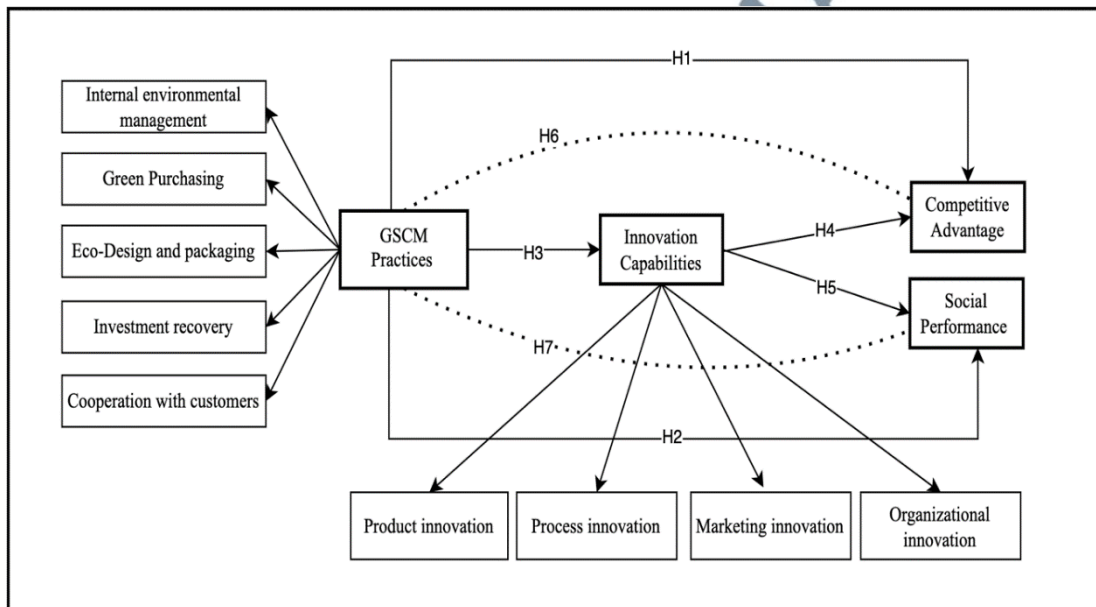


Figure 2.7: Research Conceptual Framework

2.15 Summary

This chapter discussed and reviewed all previous studies related to the direct relationships among the research variables, namely GSCM practice, innovation capabilities, competitive advantage and social performance. The first part of this chapter discussed the independent variable GSCM practices, by providing an overview of supply chain management and the shift from SCM to GSCM. Following that, the chapter identifies GSCM definitions, concepts, benefits, and dimensions. Meanwhile, the second part reviewed the firm's performance under competitive advantages and social performance which is the dependent variables of GSCM practice. Subsequently,

the mediating variable, innovation capabilities, was discussed in terms of concept, dimensions, importance, role, and functions. Furthermore, the role of innovation capabilities as a mediating variable in the relationship between GSCM practices variables with a competitive advantage and social performance was also discussed. This chapter also outlined the conceptual framework and underpinning theories. On the whole, this chapter improved the understanding of the key variables of the present study.