



**UNIVERSITY OF KWAZULU-NATAL (UKZN)**

**THE ASSESSMENT OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT  
PRACTICES AMONGST SELECTED MANUFACTURING FIRMS IN GHANA**

**by**

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Doctor of Philosophy (PhD) in Supply Chain Management**

**School of Accounting, Economics and Finance**

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## DECLARATION

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## **DEDICATION**

This thesis is dedicated to God for His guidance, blessings, and protection throughout the PhD journey.

## ABSTRACT

The study investigated whether the design and application of sustainable supply chain management (SSCM) practices in the Ghanaian manufacturing business enhance their financial performance and make them environmentally and socially responsible. The study was guided by six theories: the contingency theory, the resource-based view (RBV), the relational-view theory (RVT), the innovation diffusion theory (IDV), the stakeholder theory and the resource dependence theory (RDT). The study was underpinned by a pragmatist paradigm and followed a mixed-methods methodology, which combined interviews and surveys questionnaires to gather qualitative and quantitative data from a sample of 303 employees of Ghanaian manufacturing firms and 20 individuals who lived nearby. The data analysis findings revealed that relational, instrumental, knowledge and moral factors have a significant and positive direct effect on SSCM practices. Moreover, SSCM practices have a positive and significant effect on the economic, environmental and social performance of manufacturing firms. Barriers to the adoption of SSCM practices were also revealed. The findings led to the recommendation that firms need to use environmentally friendly materials for their products and introduce standardized procedures for recycling and disassembling products. In addition, manufacturing enterprises should collaborate with suppliers to ensure that they also adhere to sustainability standards in their processes and deliver services/products that support sustainability goals.

**Keywords:** Sustainable supply chain management; Supply chain performance; Sustainable design; Sustainable process design; Supply-side sustainability collaboration; Demand-side sustainability collaboration; Manufacturing firms Ghana.

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# CHAPTER 1 INTRODUCTION

## 1.1 Introduction

Concern about the use of natural resources in supply chain management (SCM) is increasing for several reasons, including competition, market globalisation and the increased prominence of customer experience and orientation (Ahi & Searcy, 2013). This concern has arisen because all kinds of corporate activities use natural resources that have some form of environmental impact, such as environmental degradation, carbon emission, the depletion of rare natural resources without replacement, the inequitable use of resources affecting future generations and the pollution of the environment. Moreover, the need for environmental protection at a local, regional and global level is increasingly obvious and prompts many pollution discussions.

Ensuring environmental protection when carrying out business activities should not only occur at a single firm level but also by other firms in the supply chain. Thus, because of the increasing concern about the environment, firms are supposed to practice sustainability supply chain management (SSCM). This involves all supply chain activities and members ensuring the environmental tolerability of their goods from raw material to production, from production to retail and then lastly to the end-user (consumer) (Petljak, 2019). Although SSCM is gaining importance in the business world, there is limited evidence regarding its adoption by firms in Ghana. To address this knowledge gap, the present thesis examined the implementation of SSCM practices among selected Ghanaian manufacturing companies.

## 1.2 Background to the study

With the unfolding of a new economic order, people have recognised that profit and profitability are not the only aspects of the long-term success of businesses and economies, and the future of planet Earth and its people are also determining factors (Kleindorfer et al, 2005). Therefore, businesses have been put under pressure to lessen their adverse effects on the environment and society and have incorporated environmental and social policies to enhance their business operations, which has led to SSCM as a strategy (Hsu et al., 2016).

According to Seuring et al. (2008), SSCM is the management of capital flows, information, material and a firm's integration into the supply chain in line with sustainable development's social, environmental and economic pillars. Moreover, SSCM stems from and takes into consideration the requirements of stakeholders and customers. In 1987, the Bruntland Commission issued the report entitled *Our Common Future* in an attempt to reconcile the concerns of environmental stability and economic development. By so doing, the report explained sustainable development as “development that meets the needs of the present generation without jeopardising the rights of generations to come” (UN, 1987). This view of sustainable development intends to maintain economic progress and development while protecting long-term environmental value. Therefore, it provides a framework for the incorporation of development strategies and environmental policies (UN, 1987).

It is believed that policies to protect the environment can also enhance innovation and lead to profit. This suggests that sustainable production and the supply chain must ensure a balance when achieving economic, environmental, and social goals (Borel-Saladin & Turok, 2013; de Camargo et al., 2018), which may be possible by following SSCM as a key strategy for improving the general performance of a business (Al-Odeh & Smallwood, 2012). Carter and Rogers (2008) view



SSCM as a strategy for the realisation of a business's economic, social and environmental objectives through the systematic management of crucial corporate processes that integrate the social, environmental and economic pillars of sustainability. These processes involve a firm's organisation's internal practices, which include process design and sustainable production, and external practices, such as the collaboration between a provider and a consumer, which ensure the sustainability of the supply chain (Seuring & Muller, 2008).

Section 12 of the United Nations (UN) Sustainable Development Goals (SDGs) refers to countries taking action to ensure sustainable management and the efficient usage of natural resources. Section 12.6 encourages firms to embrace sustainable practices and to incorporate sustainability information in their reporting cycle (ICCRUM, n.d.). This implies that manufacturing firms and all production systems must make efficient usage of natural resources through the prevention, reduction, reuse and recycling of waste and the mitigation of chemical emissions that pollute the soil, water and air, thereby lessening their negative effect on the health of the environment and humans.

These requirements are encapsulated in a new concept called “the triple bottom line (TBL)”, which postulates that at the convergence of a firm's economic, social and environmental objectives, it can take action not only to influence society and the natural environment positively but also to ensure long-term gains and competitive advantage (Carter & Rogers, 2008; Chardine-Baumann & Botta-Genoulaz, 2014). Moreover, Alzoubi, Ahmed, and Al-Gasaymeh (2020) contend that sustainability in the supply chain has gained the attention of researchers as global warming has increased. Not only is the business supply chain responsible for 12.9% of environmental pollution, but also the main source of toxic waste, air and water pollution, energy misuse and gas emissions (IPCC, n.d) and therefore needs to enforce SSCM to ensure environmental and social safety as

well as the equitable use of resources for economic sustainability (Markman & Krause, 2016, Mathivathanan et al., 2018).

Several studies have been conducted on SSCM practices in various regions and industries, including but not limited to manufacturing (Das, 2018; Sharafuddin, Madhavan & Chaichana, 2022; Wang & Dai, 2018; Wang, Yang & Qu, 2020; Mitra & Datta, 2014; Vurro, Russo & Costanzo, 2014; Wang, Zhang, & Goh, 2018; Paulraj, Chen & Blome, 2017; Zailani et al., 2012; Chiu & Hsieh, 2016). Some of these studies have reported positive effects of SSCM practices on environmental, social, and economic performance, while others have found mixed or insignificant effects. Therefore, further research is needed to determine whether the adoption of SSCM practices leads to improve firm performance in the context of Ghana. While there is some research on the adoption of SSCM practices in Ghana (e.g., Adegoke et al., 2021; Mensah, Diyuoh & Oppong, 2014; Kusi-Sarpong, Sarkis & Wang, 2016; Kwamega, Li & Abrokwah, 2018; Ganiyu, Yu, Xu & Providence, 2020; Nsowah, Agyenim-Boateng & Anane, 2022), there is a limited number of studies that focus specifically on manufacturing firms. This is an important research gap because manufacturing firms may face unique challenges and opportunities in adopting SSCM practices as compared to firms in other sectors. For instance, cultural and institutional factors may influence the adoption of SSCM practices in Ghana in ways that differ from other countries. Finally, while there is some research on the benefits of SSCM practices for environmental and social sustainability (e.g., Wang & Dai, 2018; Chin, Tat & Sulaiman, 2015; Govindan & Jepson, 2016; Munasinghe et al., 2019; Stroumpoulis, Kopanaki & Karaganis, 2021), there is a need for further research on how these practices can also benefit firms economically. This is important because

firms may be more likely to adopt SSCM practices if they see economic benefits, such as cost savings or improved reputation.

Manufacturing firms are considered in this study due to activities in their supply chain that causes environmental, social and economic effect (Chan, Ngai, & Moon, 2017; Iranmanesh, Zailani, Hyun, Ali, & Kim, 2019). The manufacturing sector in Ghana is known to be among the industries that deal with natural resources and produce externalities (Adarkwah et al., 2018). Even though the country is made up of 16 regions; however, manufacturing activities are centred mostly in four regional capitals – Ashanti Region (Kumasi), Greater Accra Region (Accra and Tema), Bono Region (Sunyani) and Western Region (Takoradi).

Social sustainability is essential to SSCM. It promotes social well-being and equity throughout the supply chain, from suppliers to customers, while operating ethically and socially responsibly. Social sustainability includes fair work, human rights, diversity and inclusion, community engagement, and ethical material sourcing. Supply chain social sustainability requires fair labour practises. Safe and healthy working conditions, fair remuneration, and acceptable working hours are required. Codes of conduct and audits and inspections help companies practise fair labour. Fair labour policies promote employee productivity, absenteeism, and retention, according to research (Zhu et al., 2021).

Social sustainability includes human rights. Supply chain operations must not violate human rights like freedom of association and safe and healthy working conditions. Human rights impact evaluations and methods to redress violations can achieve this. Company reputation and legal responsibility might suffer if human rights are violated (Waddock et al., 2020). Social sustainability requires diversity and inclusion. By supporting gender and racial equality, equal

opportunities, and an inclusive culture, companies can encourage diversity and inclusion. Research has shown that diverse and inclusive workplaces can lead to improving innovation, creativity, and problem-solving (Kang et al., 2021).

Social sustainability requires community engagement. Businesses may promote local businesses, participate in community development, and hire locally. Community engagement can boost the company's reputation, stakeholder interactions, and local community sustainability (Mishra et al., 2021). Suppliers must not use child labour or forced labour and use sustainable and responsible sourcing. Responsible sourcing and supplier audits and certifications can achieve this. Ethical sourcing protects workers' rights, promotes environmental sustainability, and boosts the company's reputation (Heinrichs et al., 2021).

Suppliers, customers, and local communities must work together to implement supply chain social sustainability. Stakeholder dialogues, supplier development, and community outreach can engage stakeholders. Stakeholder engagement helps firms discover social sustainability challenges, prioritise actions, and build trust and collaboration (Carter et al., 2020). In conclusion, sustainable supply chain management must promote social well-being and equity throughout the supply chain. Fair labour practises, respect for human rights, diversity and inclusion, community engagement, and ethical sourcing are needed for social sustainability. Supply chain social sustainability requires stakeholder collaboration.

### **1.3 Research Problem**

In Ghana, the manufacturing sector has reduced its share of the country's gross domestic product (GDP) over the years because raw materials, which are exported in their unfinished state, are less available and have put a strain on available manufacturing resources. The contribution of manufacturing companies to Ghana's GDP was 10.2% in 2006, 9.1% in 2007, 7.9% in 2008, 6.9%

in 2009, 6.8% in 2010, 6.7% in 2011 and 2012, 5.8% in 2013 and 5.5% in 2014 (Nti, 2015, Adarkwah et al., 2018). On average, the growth rate of the manufacturing sector from 2006 to 2018 was less than 3%, if the 17% growth rate reported in 2011 is left out (Adarkwah et al., 2018). Although according to the 2015 World Bank Doing Business Report (DBR), Ghana is 70<sup>th</sup> out of the 189 nations ranked, the manufacturing industry has been beleaguered by several challenges to its competitiveness in the global market, as evidenced in the World Bank Enterprise Survey of 2014 (Adarkwah et al., 2018). The Enterprise Survey reports that almost 90% of Ghanaian manufacturers' sales are to the domestic market, and only 26% of manufacturing firms export their goods, thereby earning less than 1% of their total sales. Just 11% have recognised international certificates (Nti, 2015).

Ghana Investment Promotion Centre (GIPC) has listed manufacturing as a priority target sector, which needs to develop by exporting food processing products, construction materials, electronic components, chemicals and health-related products, for example (World Bank, 2013). In other words, the manufacturing sector, which uses mainly natural resources and unskilled labour, and the export of manufactured products can grow just as the oil and services sector, as well as the usual exports of crude oil, timber, gold and cocoa, have done (Adarkwah et al., 2018).

The initiation, developing and implementation of sound SSCM practices by manufacturing firms in Ghana, will minimise waste generation, harmful chemical emissions, deforestation and the pollution of the air, water and soil. Furthermore, socio-economic sustainability issues, such as wealth creation, employment and social projects, need to be addressed. SSCM theory has been developed to address these issues, although businesses still seek ways to apply it in their practice. However, research on SSCM has mostly been conducted in developed nations (Geng, Mansouri & Aktas, 2017), which indicates the need to investigate it in the context of developing nations such

as Ghana. Therefore, the study investigated whether and how SSCM is implemented by manufacturing businesses to understand how the strategy could be used to promote their development.

### **1.3.1 Problem Statement**

The Ghanaian manufacturing industry needs to grow, which might be possible with the appropriate implementation of SSCM practices to ensure a firm's environmental, social and economic sustainability. The initiation, developing and implementation of sound SSCM practices by manufacturing firms in Ghana, will minimise waste generation, harmful chemical emissions, deforestation and the pollution of the air, water and soil. Failure to implement and practice SSCM in manufacturing firms in Ghana can cause uncontrolled waste generation, emissions of harmful chemicals, deforestation, and air, water and soil pollution.

Also, overseas customer requirements are becoming increasingly important for Ghanaian manufacturers to consider when implementing Sustainable Supply Chain Management (SSCM). This is because many international customers are demanding that their suppliers meet certain sustainability standards and practices as a condition for doing business.

## **1.4 Research Objectives**

### **1.4.1 Main Objective**

The main objective of the study was to investigate the role of SSCM practices by manufacturing businesses in Ghana. The attainment of this objective will determine whether strategies need to be developed to enhance the implementation of SSCM and improve the firms' performance and make them environmentally and socio-economically sustainable.

### **1.4.2 Specific Objectives**

The following are the specific objectives of the study:

1. To evaluate the SSCM practices of manufacturing firms in Ghana
2. To examine the factors that influence the adoption of SSCM practices of manufacturing firms in Ghana.
3. To investigate the impact of SSCM on the performance of manufacturing firms in Ghana
4. To assess the barriers to the adoption of SSCM among the manufacturing firms in Ghana

## **1.5 Research Questions**

### **1.5.1 Main Question**

To what extent is SSCM implemented by manufacturing businesses in Ghana? The answer to this question will determine whether strategies need to be developed to enhance the implementation of SSCM and ensure a firm's environmental, social and economic sustainability.

### **1.5.2 Specific Questions**

The following are the specific research questions:

1. What are the SSCM practices of manufacturing firms in Ghana?
2. Which factors influence the adoption of SSCM practices by manufacturing firms in Ghana?
3. Does SSCM practices impact on the performance of manufacturing firms in Ghana?
4. What are the barriers to the adoption of SSCM by manufacturing firms in Ghana, and how can firms overcome these barriers?

## **1.6 Research Hypotheses**

The following hypotheses were tested in the study:

- H1: Relational factors have a positive effect on a firm's SSCM practices
- H2: Instrumental factors have a positive effect on a firm's SSCM practices.
- H3: Knowledge factors have a positive effect on a firm's SSCM practices.
- H4: Moral factors have a positive effect on a firm's SSCM practices.
- H5: A firm's SSCM practices positively influence its economic performance.
- H6: A firm's SSCM practices positively influence its environmental performance.
- H7: A firm's SSCM practices positively influence its social performance.

## **1.7 Contributions of The Study**

The study makes significant contribution to empirical, theoretical and practitioners in the area of SSCM practices. First and foremost, the study makes an empirical contribution to the collection of knowledge on SSCM practices in the manufacturing sector by adding new data and insights. The study illuminates Ghana's SSCM implementation problems, prospects, and adoption determinants. The absence of a previous study on SSCM practises in Ghanaian manufacturing



enterprises emphasises the necessity for empirical research in this context. Also, the identification of the relational, instrumental, knowledge, and moral factors that influence the adoption of sustainable supply chain management practises is an empirical contribution of the study. These practices include pressure from stakeholders, competitive advantage, environmental understanding, and moral obligation. Examining the impact of sustainable product design, sustainable process design, and supply- and demand-side sustainability collaboration on firm performance indicators is another empirical contribution of the study. In particular, the study discovered that sustainable process design and product design were favourably linked with environmental performance, whereas collaboration between the supply and demand sides of sustainability was positively associated with economic performance. In addition, the study discovered that sustainable product design and collaboration between the supply and demand sides on sustainability were favourably connected with social performance.

In addition, the study offers light on business performance indicators that were left out in previous research. Previous research has concentrated mostly on the number of behaviours related to environmental and economic performance, with few studies considering social performance. Examining the social performance factor, this study contributes to the literature on SSCM methods and their impact on company performance. Overall, the study provides useful empirical evidence of the factors that influence the adoption of sustainable supply chain management practices and their effect on firm performance measures in Ghanaian manufacturing enterprises.

In terms of theoretical contribution, the study first contributes to stakeholder theory by emphasising stakeholder engagement in sustainable supply chain management. Engaged firms are more likely to implement sustainable practises. This suggests that stakeholder engagement is essential to sustainable practises. Second, the study identifies the important resources and

capabilities needed for sustainable supply chain management, contributing to the Resource-Based View (RBV) theory. The findings reveal that organisations with financial and technological resources are more likely to practice sustainability. This suggests that resources and competencies are necessary for sustainable competitive advantage.

Additionally, the study emphasises collaboration and partnerships in sustainable supply chain management, supporting the Relational view theory. Collaboration with suppliers, consumers, and other stakeholders increases sustainability in organisations. This suggests that sustained solutions require teamwork and partnerships. Furthermore, the study identifies elements that promote sustainable supply chain management adoption, contributing to innovation diffusion theory. Knowledge, moral obligation, and instrumental reasons impact sustainable actions. This suggests knowledge and social norms influence innovative diffusion. Lastly, the study supports Contingency (fit) theory by emphasising context in sustainable supply chain management. Overall, with the adoption of SSCM practices in Ghana, the study emphasises the relevance of stakeholder engagement, resources and capacities, collaboration and partnerships, innovation dissemination, and context. The study's findings may aid in refining existing theories or developing new ones in the domain of SSCM practices.

In terms of practitioner contributions, Ghanaian manufacturing enterprises must practice sustainable product design. The study concluded that adding sustainability into product design can provide eco-friendly products that match consumer needs while decreasing environmental effect. The study also emphasises sustainable process design's role in sustainability. Sustainable process design reduces waste, energy, and non-renewable resource use in production. When firms adopt the sustainable process design, it reduces environmental impact, operational efficiency, and resource consumption costs.

Moreover, the study also promotes collaboration among manufacturing firms with their stakeholders to achieve environmental goals. By working with suppliers and customers, organisations can create more sustainable supply chains that reduce waste, resource use, and environmental impact. Firms can improve their sustainability strategy by engaging stakeholders, including consumers, employees, and local communities. Engagement can also strengthen stakeholder connections, which can be crucial in times of crisis or uncertainty. Finally, the report emphasises transparency and accountability for sustainable targets. Firms can increase consumer and stakeholder trust by reporting on sustainability performance and communicating transparently. In sustainability, consumers want more openness and accountability from companies.

## **1.8 Thesis Structure**

The thesis comprises seven chapters.

- Chapter 1 introduces the study by explaining the background and the research problem. In addition, it presents the problem statement; the research objectives, questions and hypotheses; and the thesis structure.
- Chapter 2 presents the literature review, which includes a review of the empirical literature
- Chapter 3 presents the literature on theories relating to SSCM.
- Chapter 4 explains the research methodology, particularly the data collection instrument, the questionnaire, which was employed to collect information from respondents to accomplish the study's objectives. In addition, the chapter explains the study area; the research design; the population; the sampling technique and sample size; the source of the data; and the data collection and analysis methods.

- Chapter 5 presents the results and findings of the quantitative and qualitative data analyses, respectively.
- Chapter 6 discusses the results in light of the reviewed literature and the research objectives.
- Chapter 7 summarises the results, draws conclusions, makes recommendations and explains the implications of the study.

## **CHAPTER 2 LITERATURE REVIEW**

### **2.1 Introduction**

This chapter reviews the conceptual literature on SSCM by first explaining supply chain management (SCM) as well as the components, functions and performance of SCM. In addition, the chapter explains SSCM as well as its history, evolution, performance, components, practices, activities and drivers of SSCM. Thereafter, the chapter reviews the literature on the manufacturing sector in Ghana, the potential of its manufacturing industry, and key issues and challenges facing manufacturing in the country.

### **2.2 Supply Chain Management**

According "to the Chartered Institute of Procurement and Supply (CIPS), SCM is the managing of the flow of goods and services from the manufacturing of the” raw material into the final product consumed by the customer (CIPS, n.d.). However, there are various aspects to SCM, which are explained in the following sections.

#### **2.2.1 Procurement and Supply Chain Management**

Coyle et al. (2017) report that approximately 60% of the total cost of goods sold in a manufacturing firm involves procurement costs, which is more for service firms. Procurement management, which is part of SCM, strategies, controls and implements “the effective and efficient acquisition of all raw materials, finished goods, semi-finished goods, information and services to assist the auxiliary activities and the main operations of a firm (Pienaar & Vogt, 2014). In a supply chain (SC), procurement” connects, mobilises and ensures cooperation between a firm's external and internal stakeholders (Stevenson, 2012). Almost all manufacturing firms in Ghana import raw materials, which implies that one of their main activities is their procurement before the

manufacture and distribution of the final products (Nti, 2015; Adarkwah et al., 2018), which requires an acceptable procurement policy.

An effective procurement policy can bring about an improved quality of products, shorter lead times, collaborative relations with suppliers and customer satisfaction (Van Weele, 2018; Coyle et al., 2017). The benefits of effective procurement in manufacturing firms are the development of process technology, cash flow improvement, cost improvement, cost reduction and improved service to the end customer (Flynn & Fearon, 2010; Benton, 2013). The Ghana Public Procurement Act 2003 stipulates that procurement enables the successful delivery of projects and services, reduces corruption, encourages private sector investment and growth and promotes sound financial management by ensuring value for money in manufacturing expenditure.

### **2.2.2 Inventory Management in Supply Chain Management**

In SCM, inventory management practitioners have to maintain both efficiency and effectiveness (Adoga & Valverde, 2014). Efficiency implies minimising shortage, inventory carrying and ordering costs, while effectiveness implies filling clients' orders without experiencing stock outages (Rana et al., 2016; Horn et al., 2014). Manufacturing firms in Ghana and elsewhere aim for effective and efficient inventory management to deliver quality products on time, retain customers, gain their trust and make more profits (Addo, 2017). To ensure successful inventory management, manufacturing firms should improve inventory control as well as the demand and stock management (Kruger et al., 2013).

### **2.2.3 Logistics in Supply Chain Management**

In manufacturing, "logistics management comprises planning, controlling and implementing the reverse and forward flow as well as the storage of services, goods and related information from the point of origin to the consumption point to meet the requirement of the" client (Council of

Supply Chain Management Professionals, 2015). Logistics management connects the manufacturing firm's sources of supply with the processes, information and physical flow of products (Pienaar & Vogt, 2014). Thus, logistics management plays a crucial role in SCM because it eliminates inefficiencies and creates opportunities for the management of distribution costs (Dey et al., 2011). Factors such as industrial relations, culture, politics, infrastructure, foreign exchange rates, foreign direct investment and government policies on taxation determine the level of manufacturing firms' incorporation of SCM to make them competitive (Aqlan & Lam, 2016; Fatorachian & Kazemi, 2018).

#### **2.2.4 Information and Communications Technology in Supply Chain Management**

At every stage of SCM, information and communications technology (ICT) allows firms to collect and analyse information to enhance performance (Mehrjerdi, 2009). For instance, E-Business usage enables a manufacturing firm to enhance the competitiveness of its goods and services and enable access to its services at several places at any time. In addition, E-Business makes it easy for manufacturing firms to keep an eye on clients' choices and requests electronically (Stevenson, 2012; Dubey et al., 2016). However, studies on ICT challenges show that although more information is available, proportionately less is being effectually captured, analysed and made available to specific individuals who need it. Additionally, affected executives maintain that information is not being regarded as vital, inefficient ICT tools, a lack of reward for information and organisation silos are significant barriers to the high levels of visibility and interaction that they need (Prajogo & Sohal, 2013; Butner, 2010).

When embracing ICT, management must, therefore, comprehend its disadvantages and advantages and set up control systems to make the most of the benefits of new technology (Zhang et al., 2016)

by consistently upgrading it to maintain a long-lasting relationship with SC members (Brevis & Vrba, 2014).

### **2.2.5 Customer Service in Supply Chain Management**

According to Lundgren and Thompson (2011), customer service indicates a firm's ability to consistently exceed the client's satisfaction and need, especially the need for service, convenience, choice, innovation, design and quality. Moreover, customers want to spend less time, effort, risk, and money (Bala, 2014). Pienaar and Vogt (2014) maintain that effective customer service generates and retains client loyalty through providing regular information, extended warranties, replacement services, maintenance and repairs, after-sales service and free-call telephone services for complaints and inquiries.

Clients do not accept inferior services or products from manufacturing firms; they do not like to wait long for orders to be delivered; they do not tolerate products being out-of-stock; and they are always on the lookout for something extra from their suppliers (Horn et al., 2014). This propels manufacturing firms to do their job well when attending to their customers (Horn et al., 2014). Customer service should feature consistency, reliability, acceptable lead times, competent technical sales representatives, follow-ups, feedback through client satisfaction surveys, for example, effective aftersales service, backup service and product availability (Roh et al., 2014; Kim & Lee, 2020). Manufacturing firms have to adopt a strong customer service culture to ensure business success.



## **2.2.6 Other Aspects of Supply Chain Management**

Other aspects of SCM include supply chain “collaboration (SCC), supply chain integration (SCI), customer relationship management (CRM) and supplier relationship management (SRM), which” will be explained below (Trkman et al., 2015).

### **2.2.6.1 Supply Chain Collaboration**

Fawcett and Waller (2013) view SCC as the coordination of internal divisions and external stakeholders of an organisation to ensure the flow of goods and services through the supply chain to meet customer needs on time. This involves making joint decisions, pooling risks and sharing resources to achieve operational flexibility and cost reduction (Richey et al., 2012). Cao et al. (2010) and Soosay and Hyland (2015) add the following essential elements of collaboration: joint knowledge creation, collaborative communication, incentive alignment, decision synchronisation and goal congruence.

When forming “collaborative partnerships, attention must be given to increasing knowledge of what is to be delivered by the partnership, comprehending what signifies value for money, knowing the respective duties and making sure of appropriate responsibilities allocation (Oakland, 2014). This” depends on team-based, constructive and supportive working relationships and allowing the integration of knowledge transfer to ensure competitive goods and services.

### **2.2.6.2 Supply Chain Integration**

For successful SCI, which improves firm performance and leads to a competitive advantage, Kim and Chai (2015) propose dividing it into internal, customer and supplier integration. Internal integration involves breaking down the functional barriers between operations, marketing, finance and other departments. Customer integration entails understanding the market expectations of downstream SC members such as sales representatives who are closer to the end consumers.

Supplier integration involves the “strengthening of relationships with the upstream SC members, who are the suppliers (Kim & Chai, 2015).”

Soosay and Hyland (2015) maintain that when an SC is functioning in a dynamic environment, multiple companies need to be integrated for enhanced results through the sharing of information, trust at an institutional level, mutual decision-making and the combining of SC processes. Moreover, studies have demonstrated that SC integration within a firm or between multiple companies is propelled by the opportunity for new markets, a continually unpredictable business environment and global competition (Yunus & Tadisina, 2016; Zhao et al., 2013).

#### 2.2.6.3 Customer Relationship Management

According to Loedolff (2014), CRM entails managing interactions between a firm and its current and future clients. Evans and Lindsay (2017) mention that CRM ensures a firm's competitive edge by sectioning markets based on behavioural and demographic characteristics, advertising and targeting marketing initiatives successfully to these market segments, tracking sales trends, projecting client retention and giving feedback on why clients leave a firm or are dissatisfied.

Evans and Lindsay (2017) add that CRM would ensure that client loyalty is not confused with customer satisfaction by identifying measures of the attitudes of current and former clients and comparing them to those of leading competitors.

#### 2.2.6.4 Supplier Relationship Management

Jacobs and Chase (2014) maintain that SRM is about managing the connection between a firm and its suppliers and implementing strategies to improve relationships (Scott et al., 2011). SRM entails removing supplier duplication, sharing assets, improving SC visibility for the supplier and promoting collaborative thinking and innovation in the firm and its suppliers. Other SRM strategies include breaking down supplier and firm mindsets and barriers; improving forward-thinking and reliability in “all parties; and strategic purchasing whereby two or more firms combine orders so that each can benefit from volume discounts” (Loedolff, 2014; Scot et al., 2011).

### 2.3 The functions of supply chain management

Mentzer et al. (2001) report a range of SCM functions, highlighting a each one. According to Hassini et al. (2012), the important SCM functions are planning strategies and executing them, while Reefke and Sundaram, 2017 and Ahi and Searcy, 2013 contend that SCM should broaden its focus to include collaboration and coordination. Therefore, in the next section, this chapter explains the SCM functions of planning, execution, coordination and collaboration.

#### 2.3.1 Planning

SCM in manufacturing firms is complex because it not only involves overseeing the flow of goods and services from the manufacturing of the raw material into the final product consumed by the customer it also includes other aspects, as indicated above, particularly the management of customers and supplier relationships (Adarkwah et al., 2018). Thus, long-, medium- and short-term planning needs to take place in terms of product demand and distribution, purchasing and production capacity and networking (Stadtler, 2005; Meyr et al., 2008). Carter and Rogers (2008) mentioned that adequate planning for setting up a sustainable SC is crucial and a complete long-term strategy is needed.

### **2.3.2 Execution**

According to Seuring and Müller (2008), the execution of a SCM plan involves strategies for managing orders, material flows, inventories, delivery, transportation, warehousing and many other activities. Meyr et al. (2008) maintains that the execution of a SCM plan is the operationalisation of decisions made about production, procurement, sales and distribution in the course of planning. Moreover, Reefke and Sundaram (2017) point out that effective execution is determined not only by planning but also by collaboration and coordination.

### **2.3.3 Coordination**

According to Arshinder and Deshmukh (2008), the coordination function of SCM comprises the monitoring and evaluation of operations, and the optimisation of processes, such as distribution and procurement. Sharp and McDermott (2009) stress that coordination cut across all boundaries within and outside the firm to integrate all stakeholders in the SC into the company's orientation towards profit and in the case of SSCM, environmental, social and economic sustainability (Turner & Houston, 2009; Signori et al. 2015).

### **2.3.4 Collaboration**

Jadhav et al. (2018) observe that in the past decade, academic discourse on SCM has focussed on cross-organisational and intra-organisational collaboration, which is complex and challenging (Arshinder & Deshmukh, 2008). This indicates the development of SC visibility, a common vision and strategy, trust, active relationship management and effective change management processes (Gold, Hahn & Beske, 2010). According to Zhu and Sarkis (2006), collaboration is enhanced by SC members consistently sharing information and updates. Bansal and McKnight (2009) stress that when SCM involves sustainability issues, internal relationship management is linked to the reduction of waste and minimisation of pollution, whilst external relationship management is

connected to collaboration with shareholders and outside actors, such as customers, non-governmental organisations (NGOs), or the government, which means that SCM is under pressure to shape public opinion and regulations and become SSCM (Seuring & Müller, 2008).

According to Kirchoff et al. (2016), developing SSCM calls for an emphasis on collaboration in energy-saving, material recycling or waste elimination (Gold et al., 2010), gathering information on the environmental impact of materials purchased materials (Rivera-Camino, 2007), and the development of innovative environmental protection processes (Kusi-Sarpong et al., 2016). In contrast, a lack of collaboration results in inadequate information transfer (Harms & Klewitz, 2011), a lack of goal alignment (Moses & Åhlström, 2008), and problem-solving (Sarkis et al., 2011), which is needed for successful SCM (Lorenzoni & Lipparini, 1999) and the institution of effective SC principles (Spence & Bourlakis, 2009).

#### **2.4 Supply chain performance**

SC performance “is the outcome of SCM and indicates how efficiently and responsively the cross-functional drivers (pricing, sourcing and information) and logistical drivers (transportation, inventory and facilities)” relate to one another (Chopra & Meindl, 2013). According to the Supply Chain Council (SCC) (2012), SC performance depends on asset management, agility, cost, and reliability. Assessing SC performance comprises monitoring and evaluation as well as the valuation of the differences between desired and actual results to recognise gaps that are crucial (Melnik et al., 2013). Moreover, after valuation, the causes of not achieving goals need to be understood for the implementation of performance enhancement strategies (Qi et al., 2017).

Selecting suitable performance metrics may urge managers to apportion resources to the most important enhancement actions (Elgazzar et al., 2019). In addition, these metrics should measure SC performance from different viewpoints to provide a balanced valuation of a firm’s realisation

of set performance targets (Elgazzar et al., 2019). However, most companies miss the mark in building a satisfactory performance evaluation system and improvement strategy (Lakri et al., 2015). An effective valuation system will inform operational tactics to improve SC performance (Swift et al., 2019) in terms of capacity, cash flow time, order cycles and lead times, quality/industry standards, cost-saving initiatives, total cash flow time, order lead time, on-time goods delivery, defects percentage, human resource productivity and quality levels, for example. Strategies for improving performance at the management level involve revisiting organisational objectives, corporate financial plans and broad-based policies (Altay et al., 2018; Gunasekaran et al., 2004; Datta, 2017).

Elgazzar et al. (2019) categorise SC performance measurement into four groups based on, measures, tools and scope: process-focused systems; causal systems; integrations frameworks; and prioritisation frameworks. Process-focused systems recognise processes that require enhancement and then connect corrective measures to objectives. Casual systems evaluate the effect of enablers on the SC performance and forecast performance based on the quantitative relationship between output and input. Integration frameworks insert new functions into the SC performance measurement scheme such as linking metrics to strategy. Prioritisation frameworks provide criteria for ranking corrective measures and thus prioritising them (Elgazzar et al., 2019).

Quantitative, forward-looking performance valuation systems are not covered much in the literature (Unahabhokha et al., 2007; Fan et al., 2013; Ganga and Carpinetti, 2011; Jassbi et al., 2010; Didehkhani et al., 2009). However, the usage of system-based predictive metrics is appropriate when the aim is to avoid problem occurrence rather than correct them (Melnik et al., 2004). Lima-Junior and Carpinetti (2017) analyse 84 quantitative models for SC performance valuation, and only four allow performance prediction.

In performance prediction models, the results of lagging metrics are the after effect of leading metrics. Lagging metrics quantify past output success while leading metrics quantify future performance drivers (Lima-Junior & Carpinetti, 2019). SC “performance prediction schemes are based on artificial intelligence (AI) that maps the mathematical expressions that measure the causal relations between the output and input metrics (Lima-Junior & Carpinetti, 2019) by employing fuzzy inference rules tuned by specialists' judgment (Ganga & Carpinetti, 2011) or supervised learning algorithms (Fan et al., 2013). Hence, the usage of SC performance prediction schemes enables managers to estimate lagging metrics values and compare them against standards or performance targets to identify performance gaps and reactive action plans (Lima-Junior & Carpinetti, 2019).”

The benefits of using AI like neuro-fuzzy systems comprise the ability to manage partial truth, uncertainty and imprecision to attain robustness and tractability, thereby simulating human decision-making and interpretation ability at low cost (Ko et al., 2010; Kar et al., 2014). According to Ko et al. (2010), another benefit of AI is its capability to study from experience and generalise sample data results. In Iran, a neuro-fuzzy system developed by Jassbi et al. (2010), was used to predict SC agility in car manufacturing. Didehkhani et al. (2009) suggest a neuro-fuzzy model for predicting SC flexibility, which was used in an automotive company. Both studies examined whether there was a significant difference between the predicted and actual SC performance of the firms, although they measured only one output instead of providing a balanced and broad valuation of SC performance. An SC performance prediction system was “developed by Fan et al. (2013) based on the combination of the 5-Dimensional Balanced Scorecard (5DBSC) and Levenberg-Marquardt Back Propagation ((LMBP) neural network for SC performance evaluation (PE).”

Based on a new neural network algorithm, Wang (2013) suggests a predictive system to assess SC performance in fresh agriculture production. Like Jassbi et al. (2010) and Didekhani et al. (2009), Wang (2013) and Fan et al. (2013) use a specific set of measures selected from earlier research or described by experts. However, these metrics are incompatible with performance values used when comparing firms in a worldwide SC. To overcome this shortcoming, the “suggested metrics in the supply chain operations reference (SCOR®) model, which was developed by the SCC to analyse, evaluate and optimise SC performance, are used in conjunction with neuro-fuzzy systems. Nonetheless, in the studied literature, there are no predictive performance valuation systems based on this model.”

## **2.5 Supply Chain Risk**

Industrial manufacturing has been greatly impacted by globalisation, which has increased the pressure to enhance performance in terms of efficiency, flexibility and quality while maintaining costs. However, SC risk, which is quoted as the most significant reason for underperformance in firms, is a barrier. Aqlan and Lam (2016), Tang (2006), Wagner and Bode (2006) and Tang and Musa (2011) view SC risk as an uncontrollable, negative, uncertain and unpredictable internal (e.g. raw material shortage) or external (e.g. environmental and social factors) interruption to the production flow, thereby preventing the achievement of a firm's business goals. Risk alleviation plans are carried out to minimise the probability, incidence and/or negative effects of risks (Behzadi et al., 2018).

### **2.5.1 Supply Chain Risk Management**

The risk of external disasters such as the “fire at a Philips plant in 2000 in New Mexico, the Fukushima Daiichi nuclear disaster in 2011 in Japan, the Indian Ocean tsunami” in 2004, and the hurricane Rita in 2005, which interrupted the SC of many firms, including Ericsson and Nokia,



inspires researchers to explore supply chain risk management (SCRM) (Creighton et al., 2014; Hu and Kostamis, 2015; Kauppi et al., 2016; Blome & Schoenherr, 2011).

SCRM involves continually identifying, assessing and minimising the risks facing a firm's supply chain by developing a plan through the coordinated efforts of SC stakeholders to ensure continuity and profitability (Wieland & Wallenburg, 2012; Kamalahmadi & Parast, 2016; Manuj & Mentzer; Tang & Musa, 2011; Brindley, 2004). Wherever the risk affecting affects the SC, it is at the gathering of resources or logistics stages, Wieland and Wallenburg (2011) maintain that in addition to identifying, assessing and minimising risks, they need to be controlled and monitored. Giannakis and Papadopoulos (2016) suggest that SCRM could identify sustainability-related risks through a survey questionnaire and an empirical case study.

## **2.6 Supply Chain Flexibility Agility and Responsiveness**

### **2.6.1 Supply Chain Flexibility**

Williams et al. (2013) discovers supply chain flexibility involving the adjustment of production levels, the purchase of raw materials and transportation, for example usually takes place at the business unit level, rather than lower-level operations and specific functions. Flexibility increases resilience (Brusset & Teller, 2017) and makes the SC operationally responsive (Swafford et al., 2008) and agile (Chiang et al., 2012; Fayezi et al., 2013). Flexibility is the ability to modify the range of operations and tactics to the level required (Gligor, 2016). Investing in supply chain flexibility is deemed more beneficial than making employees redundant because manufacturing/delivery quality and quantity can adapt to shifts in demand and supply (Shishodia et al., 2019; Zhang et al., 2003; Williams et al. (2013).

### **2.6.2 Supply Chain Agility**

The rapid changes in supply chains in today's ever-evolving manufacturing environment mean that a firm should have supply chain agility to adjust its strategies quickly to maintain competitiveness and meet customer demands (Parast & Shekarian, 2019; Gligor et al., 2015; Brusset, 2016; Bernardes & Hanna, 2009; Yusuf et al., 2004). SC agility is the ability to function responsively, efficiently, cost-effectively and, above all, rapidly to change. It is a company's external and internal ability to react to market changes promptly in addition to actual and prospective interruptions (Braunscheidel & Suresh, 2009; Gligor, 2016; Gligor et al., 2015). Examining 144 US manufacturers, Chiang et al. (2012) discovered that strategic flexibility and strategic sourcing are key drivers of SC agility. In addition, visibility, responsiveness to customer demand and joint planning are enablers of SC agility (Braunscheidel and Suresh, 2009). Chan et al. (2017), contend that SC agility depends on manufacturing and strategic flexibility, which ensure a high level of customer service and resource efficiency in the SC (Um et al., 2017; Mohammed et al., 2019)

### **2.6.3 Supply Chain Responsiveness**

SC responsiveness indicates how rapidly a company can respond to changing client needs and the extent to which it meets customer demands in an ever-evolving marketplace (Nooraie, 2017). In addition, SC responsiveness indicates the speed at which it can fine-tune its output in line with product, volume, mix and delivery flexibility in response to the external stimulus of a client's order, for example (Donk & Vaart, 2007). To ensure proactive and reactive SC responsiveness, a firm might speed up lead time and transportation without sacrificing the quantity and quality demanded by clients (Singh & Sharma, 2015; Holweg, 2005; Bernardes & Hanna, 2009) . At the administrative level, SC responsiveness involves quick decision-making on what, when and how much should be used to respond to changing market conditions.

SC responsiveness requires agility and flexibility in providing clients with the correct product timeously at the correct place in the appropriate time length (Kim et al., 2013; Nooraie, 2017; Um et al., 2017; Chen et al., 2019). Roh et al. (2014) specify three aims for SC responsiveness to client needs: (i) to increase flexibility by centralising and streamlining SC planning procedures for market expansion and new product development; (ii) to enhance agility by adjusting strategies for delivery and production quantities, for example; and (iii) to minimise risk by eradicating prospective sources of SC disruptions and bottlenecks. Moreover, companies with SC agility and flexibility will be cost-effectively responsive to clients' changing demand for goods and services (Saeed et al., 2019; Um et al., 2017). SC responsiveness is conceptualised as intra- and inter-organisational (business-level) responsiveness, which requires SC agility, and operational-level responsiveness, which requires SC flexibility (Um et al., 2017; Bernardes & Hanna, 2009).

## **2.7 Supply Chain Technology**

The technology-organisation-environment (TOE) framework explains that an organisation's organisational and environmental context determines its choice of technology (Francisco & Swanson, 2018; Khishtandar et al., 2017; Baker, 2012; Zandieh et al. 2017; Shaaban et al., 2018; Kheybari et al., 2019). Mougayar (2016) suggests that it is difficult to introduce a new technology inside an established SC system, and the software has to satisfy some basic conditions. In the context, of SC, Blockchain technology (BT) satisfies basic conditions by doing the following (Kim & Laskowski, 2018; Deloitte, 2019; Hastig & Sodhi 2019):

- Decreases bureaucratic paperwork
- Makes transactions cheaper and faster
- Makes use of trustless smart contracts

- Decreases loss from grey market trading, uncertainties, and human errors
- Increases the traceability and transparency of manufactured goods and procedures
- Keeps trace of all data (certification, quality, location, date, price, etc.), and other pertinent
- Builds connectivity between SC stakeholders.
- BT is useful in the SC not only because of its widespread use worldwide but also its transparency, which enhances SC performance (Saberri et al., 2019).

### **2.7.1 Blockchain Technology**

Blockchain technology (BT) is a structure (block) that stores a network of records of transactions in decentralised databases (the chain), which are freely accessible (Kouhizadeh & Sarkis, 2018; Saberri et al., 2018; Hofmann et al., 2018). Singh (2018) maintains that the use of BT is projected to increase to \$7683 million by the year 2022, at a compound yearly growth rate of 79%. According to Kamble et al. (2019), BT has taken the business world by storm and has the increasing attention of both industry practitioners and researchers. Wang et al. (2019) maintain that BT is projected to transform traditional transactions in many areas into a diversity of potential areas.

Sikorski et al., Haughton, and Kraft (2017) emphasise that BT is a digital database that can store any kind of information, such as events, records and transactions, with stated guidelines for information updates. As more transactions (data and information) are added, the system continuously grows in the shape of blocks. The network develops as the blocks are added, and these blocks connect and form a chain with the use of a hash. Cole et al. (2019) points out that a blockchain system is a well-ordered list which contains smart contracts and transactions.

According to Ouaddah et al. (2017), as BT offers a general-purpose programming infrastructure, application-specific programmes that control currency transfers based on smart contracts or predefined functions can be run on a blockchain system. BT does away with the function of an

intermediary or third party to overlook and control the system. Rather, BT employs a transparent consensus system that makes sure that only valid transactions are carried out (Bocek & Stiller, 2018). All BT activities can be seen by the participants of the network; hence BT avoids malicious activity.

According to Awaysheh and Klassen (2010) and Shen, Choi, and Minner (2019), transparency is the degree to which information is easily accessible to parties involved in the exchange and to onlookers. Therefore, BT technology allows the transparency of information to all members of the SC involved in the design, production, sale and delivery of the manufactured products. The transparency of BT, ensures the visibility of problems, particularly environment, social and economic challenges, although ethical procedures, safety concerns and cost performance, for example, deserve attention (Williams and Gerber, 2015; Hastig and Sodhi, 2019; Wang et al., 2019). However, Saberi et al., (2018) maintain that limited knowledge and experience of BT has brought about considerable hesitancy to invest in it

## **2.8 Supply Chain Transparency**

Francisco and Swanson (2018) and Chen et al. (2018) suggest that SC transparency comprises three dimensions: a) transparency about the scope of operations, b) transparency about production and (iii) transparency about participants. Tachizawa and Yew Wong, 2014 and Dou et al. (2018) maintain that transparency has to occur throughout the SC and members should not be neglected. Additionally, transparency has to occur in all facets of the SC and information should not be concealed. For example, a lack of transparency about services or products, means that clients cannot learn about their features, for instance, food safety, the origin of the raw materials, the components and the manufacturing process (Kshetri, 2018; Grimm et al., 2018; Hastig & Sodhi, 2019; Koetsier, 2017; Saberi et al. 2019a).

Transparency is needed about negative aspects of the SC, such as poor conditions in factories, forced labour, waste generation, environmental degradation, illegal and unethical practices, disruptions to the process, production crises and risks (Fahimnia et al., 2018). |

## **2.9 Sustainability**

Sustainability is the prevention of resource depletion and the generation of new resources to replace those used (Barbieri et al., 2010), which Elkington (2013) maintains should take place in environmental, social and economic contexts. Even though sustainability has become a mantra in the modern world, there is still a lack of commitment to minimising environmental destruction and the depletion of resources. In addition, the term “sustainability” is often confused with “sustainable development”. Dovers and Handmer (1992) maintain that (a) “sustainable development is a means to attain sustainability, and (b) sustainable development is a goal, whilst sustainability is a means. However, others view sustainability as a distant, difficult objective and sustainable development as a process that advances towards sustainability (Salas-Zapata et al., 2011; Lazaretti et al., 2019). The terms “sustainable” and “sustainability” are linked to many constructs: sustainable cities (Berke, 2016), sustainable tourism (Tao & Wall, 2009; Fodness, 2016), sustainability at the local government level (Brugmann, 1996), sustainability in SCs (Carter and Easton, 2011; Pagell and Wu, 2009).”

The theory of “sustainable development merges the idea of development with the concept of sustainability, which was initially linked to the topic of intergenerational fairness in the Brundtland report, entitled *Our Common Future*, which was accepted by the United Nations World Commission on Economic Development (WCED). According to WCED (1987), sustainability is “the development that sees to the needs of the current without surrendering the capabilities of

future generations to meet their wants”. This description serves as the base for the present as well as upcoming research in the field of sustainability.”

“Many writers have regarded sustainable development as a procedure to attain sustainability (Brockhaus et al., 2013; Diesendorf, 2001), while others have regarded sustainability as an ecological component of sustainable development (Holden et al., 2014). However, many writers have argued and strived to disregard the dissimilarity between” ‘sustainability’ and ‘sustainable development’ (Ahi & Searcy, 2013; Carter & Easton, 2011; Seuring et al., 2008; Mihelcic et al., 2003). The idea “triple bottom line” (TBL) of environmental, social and economic sustainable development suggested by John Elkington (Elkington, 1998) has replaced the outdated idea of the single bottom line of loss and profit (Singhal et al., 2005) and the dual bottom line of social and environmentally sustainable development, whereby according to Weitzman (1997), sustainability is defined as an “annuity-equivalent” degree of resource utilization and environmental and social resources are a kind of capital that requires improvement.

Mihelcic et al. (2003) explain sustainability as

the design of industrial and human systems to guarantee that humanity’s usage of cycles and natural resources does not bring about reduced quality of life owing either to future economic prospects or the harmful effects on the environment, human health, and social conditions.

Sustainability is an attempt to remove or avoid the irresponsible actions that environmental, social and economic systems. According to Caniato et al., (2012), to attain sustainability across the entire SC, collaboration and integration in handling environmental, social and economic issues at each point have to be intensified (Pagell & Wu, 2009). Thus, institutions are accountable for their supply chain partners’ activities as well as their own (Pagell & Wu, 2009).

## **2.10 Sustainable Supply Chain Management**

Sustainable supply chain management (SSCM) accounts for what is absent in traditional SCM but is required in today's business (Büyüközkan & Göçer, 2018). Dubey et al. (2017) underline that in recent years, the concept and practice of SSCM have attracted the attention of practitioners and academicians. While there is no single definition, current definition's view SSCM as integrating environmentally, socially and economically viable practices throughout the SC to ensure its sustainability (Dubey et al., 2017). Carter and Rogers (2008) explain SSCM as a firm's transparent, strategic attainment of a firm's economic, environmental and social objectives. According to Elkington (1998), when SCM equally integrates the three dimensions of a firm's sustainability and long-term viability (society, the environment, and the economy) it becomes SSCM. Thus, attending to environmental, social and economic concerns, SSCM ensures the sustainability of the internal production process and external practices, such as collaboration between manufacturer and consumer (Seuring & Muller, 2008; Pa & Wu, 2009).

SSCM is defined by Seuring and Müller (2008) as the management of capital flows, information and material together with firms' collaboration with SC members in achieving its performance objectives while attending to sustainable environmental, social and economic concerns. Lately, owing to concerns about the sustainability of the firm and its SC, sustainability has become a corporate policy, which affects strategic operational decisions made by management consisting of engineering, logistics, quality control and purchasing managers, for example (Bendul et al., 2016; Gunasekaran et al., 2004; Bals et al., 2019).

Sustaining high levels of production and consumption in a mass-market setting whilst attending to environmental, social and economic concerns might be, however, a challenge (Kozlowski et al., 2015) and would involve changes in the manufacturing process. In addition, large pivotal



manufacturing firms may encounter problems in liaising with a large number of comparatively small enterprises producing raw materials who would be expected to attend to environmental, social and economic concerns too.

### **2.10.1 The Evolution/History Of SSCM**

SSCM has evolved from the concept of a firm viewed in terms of profit alone to one that has environmental, social and economic responsibilities. In particular, corporate social responsibility (CSR) means that a firm has to consider manufacturing holistically and issues, such as safety, philanthropy, human rights, diversity and the environment in its SC activities (Carter & Jennings, 2002; Carter, 2005; Murphy & Poist, 2002) Carter and Jennings (2002) integrate the literature on social responsibility in SSCM and refer to Carroll's (1991) hierarchy of ethical, legal, economic and discretionary responsibility.

Due to a lack of integration of financial performance into a framework of social responsibility, business managers have, however, usually perceived social responsibility as an add-on, responsibility, which does not necessarily generate fiscal returns (Walley & Whitehead, 1994). Thus, a firm's profit-related standalone activities are positioned by Murphy and Poist (2002) within a social responsibility rubric. Carter and Rogers (2008) build a framework to illustrate SSCM (see Figure 2.1 below). The nucleus of this framework is Elkington's (1998) TBL (the intersection of economic, social and environmental sustainability).

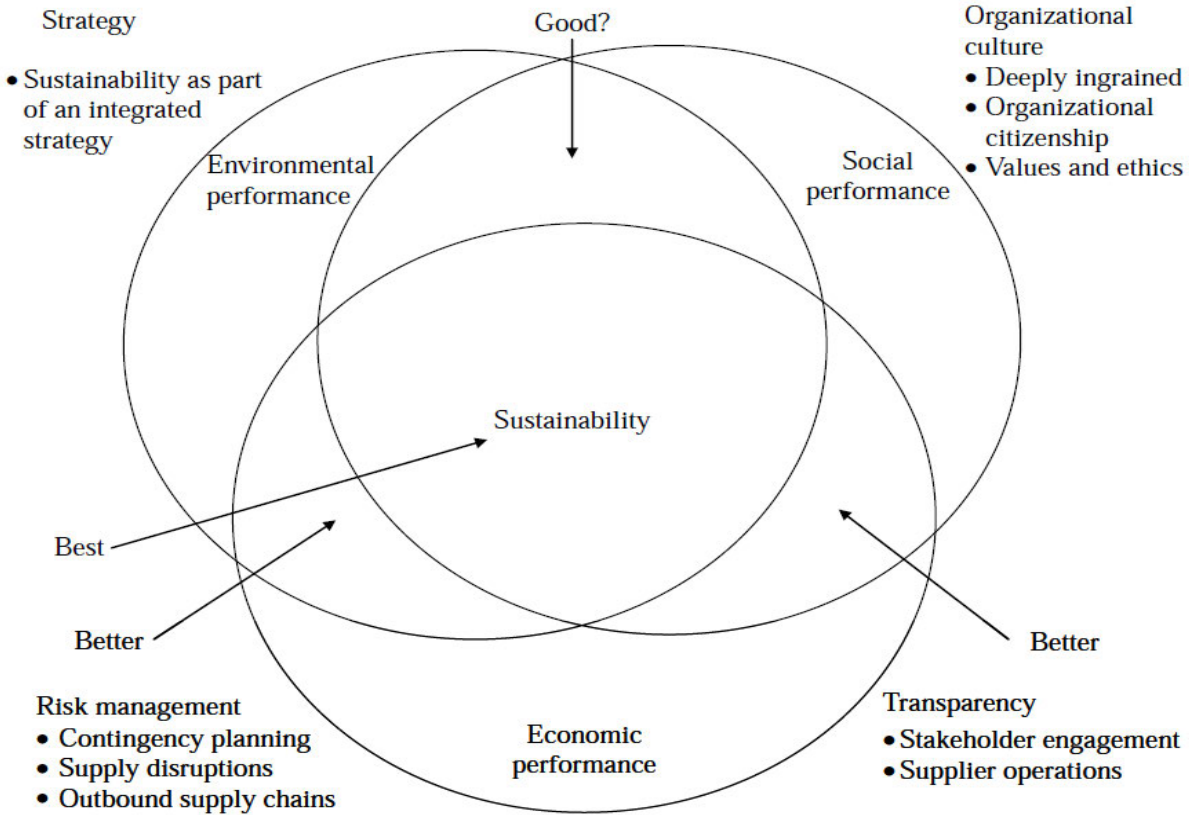


Figure 2.1: Sustainable Supply Chain Management

Source: Elkington (1998); Carter and Rogers (2008)

Figure 2.1 above shows the four facilitators of SSCM:

- a) Strategy, which is purposefully and holistically recognising individual SSCM initiatives that support and side with the firm's overall sustainability policy
- b) Risk management, which comprises contingency planning for both the downstream and the upstream SC
- c) Organisational culture, which is deeply entrenched and includes organisational citizenship, expectations, high ethical standards and respect for society (both outside and within the firm) as well as the environment

- d) Transparency in proactive engagement and collaboration with stakeholders, which includes visibility and traceability in the downstream and upstream SC

### **2.10.2 SSCM Performance**

As the performance of SSCM is grounded in the TBL approach, it is defined in environmental, social and economic terms. Lee et al. (2012) maintains that inter-organisation collaboration and linkage result in environmental improvement. In particular, according to “Zhu et al. (2005), relationships with suppliers help the development and adoption of innovative environmental technologies.”

SSCM “can ultimately lead to improved financial performance, thereby contributing to the economy through employment creation (Rao and Holt, 2005). Nonetheless, Bowen et al. (2001)” point out that the financial performance and profitability of SSCM practices are not realised in the short term.

### **2.10.3 The Components Of SSCM**

Figure 2.2 below indicates the components, plan, source, make, deliver and return, of SSCM from the supplier through the producing company to the client, which are achieved by the collaboration and integration of the end-to-end business partners in the SC.

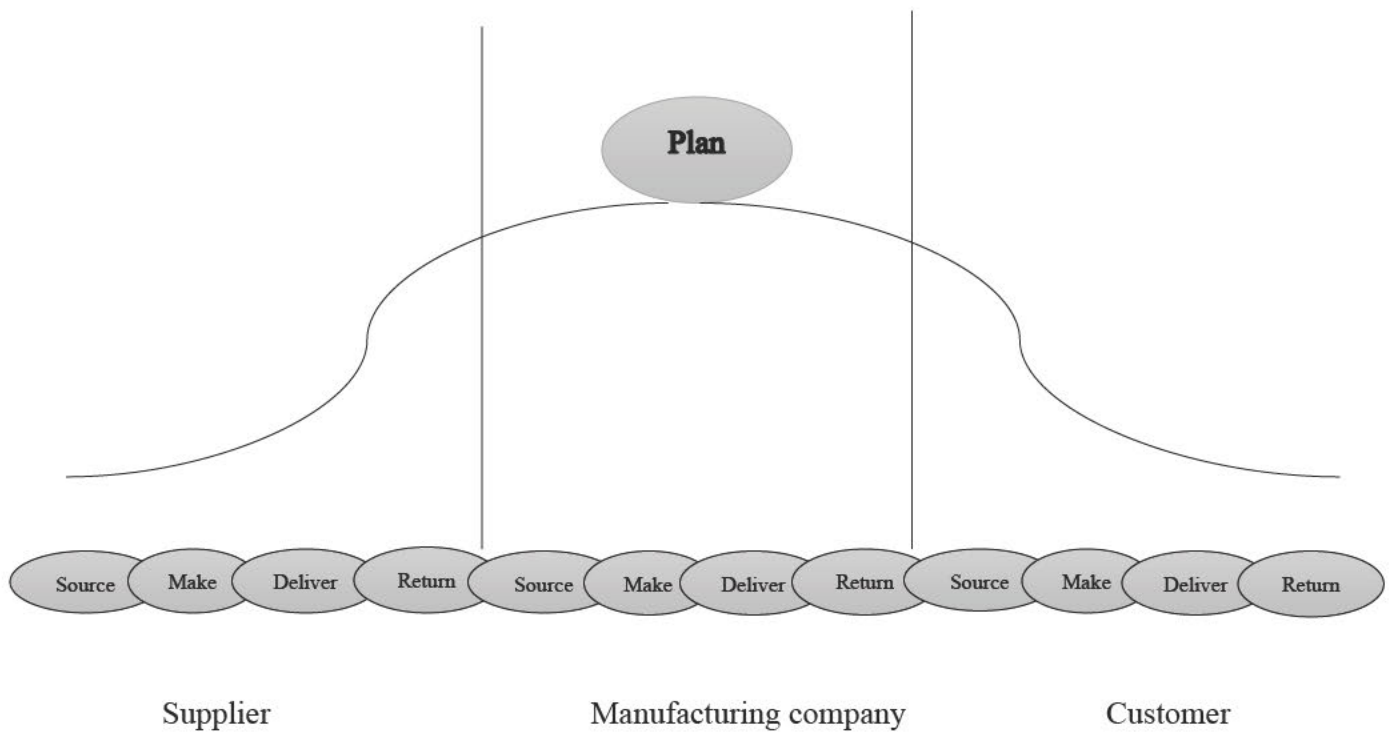


Figure 2.2: Components of SSCM

Source: Ronoh (2014)

- **Plan** is the SSCM component, which is essential to manage strategically all resources that go towards providing client demand for goods or services. An important part of planning is forming a series of metrics to supervise the SC so that it is effective, cost-effective and leads to high-value, quality products for clients.
- **Source** is the selection of suppliers of the services and materials required to manufacture the goods.
- **Make** is the production step where the activities required for packing, manufacturing, testing and planning for distribution are scheduled. It is measured by worker productivity, production output and quality levels.

- **Deliver** is the logistics, which coordinates client orders, designs a network of warehouses, selects carriers to deliver goods to clients and arranges a billing system for payments.
- **Return**, which is a challenging aspect, generates a network for receiving excess and faulty goods back from clients

#### 2.10.4 Sustainability in SSCM

As stated earlier, SSCM integrates the three pillars of sustainability, which are further discussed below.

##### 2.10.4.1 *Economic Sustainability*

Sloan (2010) underlines that economic sustainability is ensured by profits made by the SC in addition to the economic benefits received by employees and the host community of a firm. It depends on a firm's cost-effective use of resources; financial viability and competitiveness of the industry; and its contribution to the sustainable economic development of the community. The European Commission (2001) reports that appropriate technologies, effectual production structures and income source diversification ensure economic sustainability.

Economic sustainability is ensuring economic welfare without forgetting the future of a firm (Votano et al., 2004b). An economically sustainable organisation must produce services and goods constantly, uphold practicable government and external debt levels and prevent excessive sectorial imbalances, which harm industrial or agriculture production (Harris, 2000). The four criteria for economic sustainability are as follows (Sloan, 2010):

- ✓ **Financial Health:** return on working capital, cost of goods sold and profitability ratio
- ✓ **Economic Performance:** market value, productivity, transportation cost per unit, product defect rate and order fill lead time

- ✓ **Market and Structure:** market share, the extent of client base, the extent of supplier pool and the extent of vertical integration
- ✓ **Systems or Institutions:** quality management system in use, standards certification and regulatory compliance

Economic sustainability includes all endeavours to use resources effectively and responsibly, manage risks, anticipate and decrease costs, attract customers, create jobs and promote competitiveness and profits, whilst promoting long-term profitability (Mahler, 2007; Caster & Easton, 2011).

#### *2.10.4.2 Environmental Sustainability*

Miemyczyk et al. (2012) maintain that firms can ensure environmental sustainability by continually taking action and making decisions to safeguard nature, with specific emphasis on conserving the environment to support humans. Environmental sustainability compels firms to target more than making a short-term profit and to understand their long-term effect on nature, by considering the impact manufacturing might make on the environment (Kaufmann & Carter, 2010).

Sloan (2010) and Goodland (1995) mention energy resources, raw material, minerals, soil and water, which are all taken from the environment and their longevity has to be considered by manufacturing firms. In addition, their use in the manufacturing process might damage the environment, especially the use of fossil fuel energy, which harms the atmosphere. Thus, the sustainability of a business includes sustaining the environment (Nuertey, 2015).

#### *2.10.4.3 Social Sustainability*

Social sustainability is ensured by a firm developing and maintaining business practices that are favourable to its employees, members of the SC and the community (Sloan, 2010). Mahler (2007) maintains that a firm can enhance social wellbeing by improving labour conditions and ensuring

that SC activities are socially responsible. In addition, firms should invest in the community's well-being and poverty reduction (Torjman, 2000).

Sloan (2010) lists the following areas of social responsibility:

- ✓ **Internal Conditions/Workplace:** prospects for career development, healthcare, worker contracts, wages, number of deaths and/or accidents per person-hour of work
- ✓ **Systems/Institutions:** Monitoring and evaluation of safety and health management, regulating compliance, hours of safety training per worker and social factors.
- ✓ **External Conditions/Community:** healthcare benefits and product liability.

Firms should not only focus on productivity but also offer job security, respect for employees' wellbeing, labour and human rights, participation, collective bargaining, health, freedom to join unions and the need for dialogue, consultation, information, protection and decent wages (Schneider, 2007). SSCM requires collaborating with suppliers to ensure social responsibility. This involves encouraging the equitable treatment of suppliers and fighting modern slavery (Russell, Lee & Clift, 2018). Social auditing programmes can verify supplier compliance with labour and social norms. They can create socially sustainable rules of conduct and supplier contracts. Organisations can also teach and support suppliers to achieve social sustainability. Organizations can improve their brand image and contribute to a more sustainable and just world by encouraging social sustainability in their supplier chains. Thus, SSCM is democratic with the intent of offering a good quality of life for members.

### **2.10.5 SSCM Activities**

SSCM activities can have multiple positive effects on society and the environment. These activities can generate social advantages such as creating new jobs, improving working conditions, and increasing employee morale (Zaid, Jaaron & Bon, 2018). SSCM can also contribute to

environmental protection by minimising waste and pollution, conserving natural resources, and reducing climate change. This could result in a safer and healthier environment for individuals and communities.

#### *2.10.5.1 Sustainable Design and Packaging*

In SSCM, the first activity is developing a sustainable design (SD) for manufactured goods and packaging (see Figure 2.3 below). Businesses can create environmentally friendly and socially responsible products, such as those made from recycled materials and those that support fair trade. The SD should ensure that the manufactured goods can be remanufactured or recycled. Navin-Chandra (1991, cited in Fortes, 2009) is the first to explain the necessity for a design to ensure sustainability and eliminate product waste. Baojuan (2008) points out that not only does an SD positively affect the environment, but it also saves money in the long run.

Toupin (2001) adds that an SD helps a company gain clients' respect and improves products. In the 1990s, firms became interested in environmentally-friendly packaging, accessing and using raw materials whilst respecting the environment and recycling was observed (Dorn, 1996). According to Baojuan (2008), an SD ensures not only the sustainability and minimisation of packaging because it is reused but also the prevention of waste through biodegradable packaging.

#### *2.10.5.2 Sustainable Production*

In SSCM, production is the second most important activity (see Figure 2.3). Environmentally-friendly production can be attained by employing new technology and lean production will minimise resources/raw materials (to attain a low input and high output) and pollution, waste and hazardous pollutants (Kassinis & Soteriou, 2003; Farahani et al., 2009; Srivastava, 2007; Liang and Chang, 2008; King & Lenox, 2001; Rothenberg et al. 2001).



The just-in-time technique means that production material is ordered as needed to save inventory costs, and recycling, which sustains the environment, as explained in the section on the packaging, are other SSCM production activities (Baojuan, 2008). In addition, Fortes (2009) mentions reverse logistics, which involves retrieving an already sold product for repurposing recycling. These practices can help alleviate the consequences of climate change and lessen the environmental impact of production.

#### *2.10.5.3 Sustainable Marketing*

As indicated in Figure 2.3 below, marketing follows production in the SC. However, to ensure sustainable marketing, firms should promote socially and environmentally responsible products because they have been locally sourced, produced sustainably and are recyclable (Baojuan, 2008). Sustainable marketing can improve competitiveness and cost savings (Rao & Holt, 2008). By promoting socially and environmentally responsible products, firms can differentiate themselves from competitors and build brand loyalty among environmentally conscious consumers.

#### *2.10.5.4 Sustainable Transportation*

Sustainable transportation is an important part of SSCM, and it entails minimising the environmental impact of the transportation process while guaranteeing fast and effective product delivery. Kam et al. (2006) emphasis that environmentally friendly and green infrastructure, modes of transportation, fuel sources, and management/operational techniques are necessary for sustainable transportation. This suggests that organisations should adopt renewable energy sources such as electric vehicles, optimised route planning, biofuels, and hybrid technologies to reduce greenhouse gas emissions and other pollutants. The implementation of sustainable transportation practises can contribute to a reduction in a company's carbon footprint, thereby enhancing its

reputation and market competitiveness. This can also help to reduce traffic congestion and air pollution, making communities healthier and more liveable.

#### 2.10.5.5 Sustainable Purchasing

Sustainable purchasing is the buying of products used in manufacturing that are environmentally friendly, such as recycled materials, biological and biodegradable substances, water- and energy-efficient products, alternative, renewable and green energy sources, non-toxic chemicals and resources that do not pollute or leave much waste (Liang and Chang, 2008). In addition, the sustainability of products already purchased could be ensured by sorting them according to the degree of greenness, dumping, scrapping and disposing of those that are not environmentally friendly and recycling (Min & Galle, 2001). Figure 2.3 below shows the stages of SSCM activities.



**Figure 2.3: Stages of SSCM activities**

*Source: Baojuan (2008)*

#### 2.10.6 SSCM and the Triple Bottom Line

According to Carter and Rogers (2008), the triple bottom line (TBL) concept refers to a firm's protecting the environment, being socially responsible and performing well financially. Thus, the three environmental, social and economic sustainability pillars underpin SSCM, which should ensure a firm's success (Foran et al., ). Wang and Sarkis (2013) maintain there is a relationship between green practices in the SC system and fiscal performance:

[An] integrated SSCM, jointly comprising environmental and social SC management, efforts are positively connected with corporate fiscal performance calculated by the return

on equity and return on assets, and the positive impacts can have a delay of no less than two years. (p. 34)

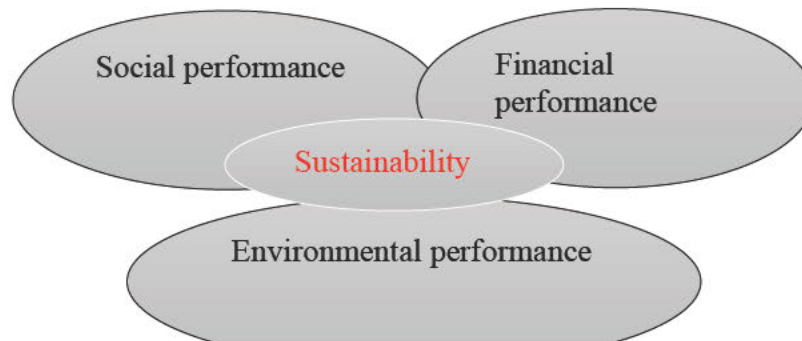


Figure 2.3: The triple bottom line

Source: Elkington (1998).

Integrating sustaina

cial problems, as

indicated by Quak and De Koster (2007):

Relations between economic consideration with environmental and social issues, like carbon dioxide emission, congestion, and noise pollution have been considered in studying retailers' sensitivity to sustainability policies. (p. 56).

Rao and Holt (2005) contend that firms are under pressure to base their SC on the TBL to integrate sustainability, thereby maintaining a competitive edge and boosting their market share. Large and Thomsen (2011) provide evidence of this in their study in Germany and show that by embracing sustainability, SCM enhances a firm's performance and satisfies its customers.

### 2.10.7 SSCM Practices

To identify SSCM practices, Mathivathanan et al. (2018) put forward the following questions:

- i. How do companies convert a prevailing supply chain into one that is sustainable?
- ii. How does a company gain a competitive advantage over its competitors that is devoid of social and environmental compromise?

- iii. How does a company accomplish a high-level performance in solving environmental and social issues?
- iv. What are the paramount means for a company to address possibly disastrous modifications of market trends initiated by foreign investors?

The answers to these questions will guide the study in terms of SSCM practices. Markman and Krause (2016) note that SSCM practices are based on two principles: (i) SSCM practices have to improve ecological conditions, pursue ethical principles to promote social justice and enhance economic vigour; and (ii) SSCM practices have to give precedence to the economics, followed by society and then environment.

In the past decade, SSCM has gained the attention of researchers (Beske & Seuring, 2014), and scholars, such as Walker and Preuss (2008) detect barriers to SSCM practices. Pagell and Wu (2009), by conducting a case study, classify SSCM practices in terms of their success in maintaining a competitive edge. Gold et al. (2010) points out that an SC must have all the necessary internal resources to carry out SSCM practices. Ageron et al. (2012) design a conceptual framework for SSCM, clarifying the features of, barriers to and reasons for SSCM practices.

Zailani et al. (2012) examines the positive effects of SSCM practices on a company's social and economic performance. Morali and Searcy (2013) conducted 2a study on Canadian companies' SSCM practices and determined the difficulties they faced. In Malaysia, Beske et al. (2014) studied the SSCM practices that accompanied food production and summed up how they enable firms to gain control of their SC and maintain a competitive edge. Employing interpretive structural modelling (ISM), Jia et al. (2015a) detect and examine prevailing SSCM practices in the mineral and mining sector. Dubey et al. (2016) use an alternative approach to the study of SSCM by formulating a conceptual model that investigates the drivers of SSCM and how they relate to one

another. “Wu et al. (2016) quantitatively explore the relationship between SSCM and firm performance, whilst Esfahbodi et al. (2016) study the role of governance in SSCM practices and firm performance in terms of the economy and the environment. In Arab nations, Hussain et al. (2016) proposed a practical, comprehensive framework for carrying out and” assessing SSCM practices.

According to Font, Tapper and Schwartz (2008), various factors influence the intensity (for example, number of suppliers) and the level of integration (for example, the diversity and quantity of sustainability initiatives) of SSCM practices. Thus, it is difficult to decide which SSCM practices are appropriate and measure their success.

Research has indicated the need for and the advantages of SSCM, which ultimately improves an organisation's performance (Luthra et al., 2017). Furthermore, in general, companies recognise the value of moving from a traditional SCM to an SSCM. In a country like Ghana, manufacturing firms, which are major contributors to the country's GDP, have become aware of the TBL and interlinking SSCM practices (Govindan & Jepsen, 2016). Therefore, a study to determine whether these practices are adopted and the extent of their implementation would contribute to the literature. No studies have been conducted on SSCM practices in Ghanaian manufacturing firms, which is a vacuum that the current study aimed to fill.

#### *2.10.7.1 SSCM Practices and the Competitive Advantage*

Scholars have contended that the introduction of socially and environmentally responsible initiatives like SSCM in a firm can lead to extra costs for community development, employee training and setting up environmentally friendly policies, for example (McWilliams & Siegel, 2011), which might prevent it from maintaining a competitive advantage. However, research has also shown that considering the environment and society can help a firm in that green practices

improve customer goodwill, employee morale and relations with shareholders, such as (i) investors who put more into the company; and (ii) government organisations that decrease regulatory costs (Sarkis et al., 2011; Arya & Zhang, 2009).

McWilliams and Siegel (2011), Barney (2012) and Orlitzky et al. (2003) maintain that SSCM practices, which integrate environmental, social and economic responsiveness, would enhance a firm's reputation and brand image in the eyes of shareholders, customers and the public, thereby beating the competition in terms of financial performance. Porter (1985) and Tracey et al. (1999) argue that effective and efficient planning, strategising, decision-making, production and pricing contribute to a firm having a competitive edge.

When companies offer products of the same quality and value as their rivals to clients at a reduced price, they enjoy a cost advantage (Porter, 1985). However, a company can also beat the competition by selling products that differ from those of its rivals but are superior, whereby it has a differential advantage. In addition, a company can maintain a competitive edge by producing an item at a lower cost than its rivals, thereby having a comparative advantage. However, a company can have a competitive advantage whereby it does not rely on price to maintain its superiority over its rival and might have other advantages, such as greater customer satisfaction or a product with unique features (Porter, 1985; Ranko et al., 2008).

#### **2.10.8 Drivers of SSCM**

Various internal drivers, enablers and triggers persuade firms at different levels of the SC to accept SSCM (Varsei et al., 2014; Hsu et al., 2013; Köksal et al., 2017; Caniato et al., 2012; Meixell & Luoma, 2015; Haverkamp et al., 2010). A particular driver is clients, who, because of world awareness of environmental and social concerns, expect firms to incorporate them in their

activities and to be transparent about how they realise sustainability goals in manufacturing their products (Ben Abdelaziz et al., .2015).

According to Schrettle et al. (2014), “Glover et al. (2014) and Caniato et al. (2012), SSCM drivers are arranged in the literature according to their level of effect and their importance or contribution to the SC. According to organisational theory, SSCM drivers can be classified as mimetic drivers, normative drivers and coercive drivers (Glover, et al., 2014, Hsu, et al., 2013).” Shareholder theory contributes to an understanding of the role of forces exerted by diverse shareholders on the execution of sustainability plans (Varsei et al., 2014). Following shareholder and organisational theory, SSCM drivers are recognised and broken down into internal and external drivers (Schrettle et al., 2014; Haverkamp et al., 2010; Walker et al., 2008) as presented in Figure 2.5 below.

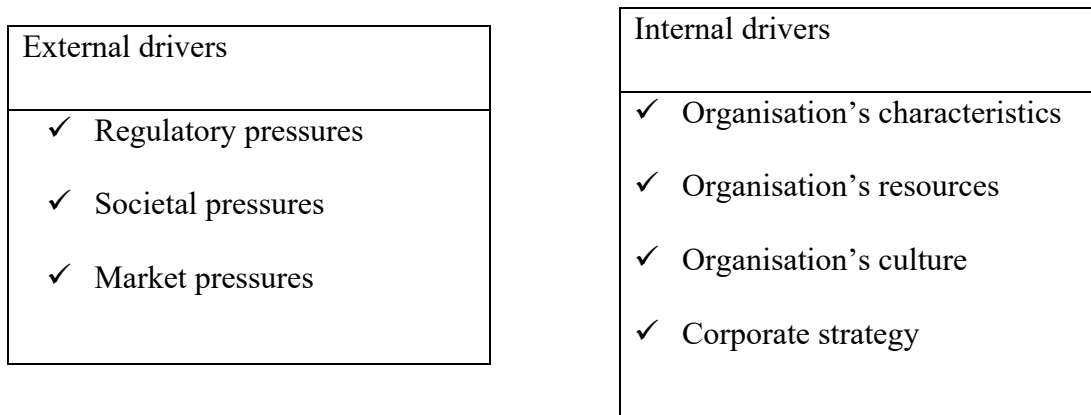


Figure 2.4: Classification of SSCM drivers

Source: Schrettle, et al., (2014)

#### 2.10.8.1 External Drivers

A focus of many studies, external drivers signify exogenous pressures produced outside an institution and are believed to have more effect than internal drivers (Walker et al., 2008; Dou et al., 2015). External drivers comprise features outside the institution but greatly affect the institution's internal activities. Moreover, they comprise pressures that each institution should

follow to avoid losing its social standing and reputation. External drivers have compelled firms to involve environmental and social awareness in their SCM and other business facets.

External drivers are grouped into three: (1) market pressure (2) societal pressure (3) regulatory pressure, which forces firms to embrace transparency and show their regulatory and legislative compliance to stakeholders and investors who expect environmental and social awareness practices (Jayaraman et al., 2007).

✓ Regulatory pressures

Regulatory pressures are among the most mentioned drivers in the literature (Walker et al., 2008; Beamon, 1999) and are used by both supranational (international or local) and national regulatory organisations in the form of incentives, procedures, laws and standards to foster sustainability practices (Xu et al., 2013; Hsu et al., 2013). According to Schrettle et al. (2014), these drivers majorly affect institutions' sustainability tactics and compel organisations to accept specific sustainability practices. Accepting imposed legislation prevents institutions from obtaining penalties and fines. Other regulatory drivers are trade/professional associations, certification requirements, and international regulators, such as the International Organisation for Standardisation (ISO), and government or regional agencies, such as the European Union (EU) (Schrettle et al., 2014; Hsu et al., 2013; Huang & Kung, 2010; Zhu & Sarkis, 2004).

✓ Societal pressures

Societal “pressures, also known in the literature as societal norms and values (Schrettle et al., 2014) are the demands or expectations of different interest groups that institutions implement sustainability practices (Schrettle et al., 2014, Walker et al., 2008). These pressures increase public consciousness of safety and health, social well-being and human rights, for example (González-



Benito & González-Benito, 2009). Societal pressures come from” the community, consumer organisations, value-based networks, societal groups, such as environmental activists, the media/press and NGOs, for example. (Schrettle et al., 2014, Hsu et al., 2013, Freeman, 2010).

✓ Market pressures

Market drivers reflect pressure from consumers, who expect products that are produced with sustainability in mind. If a firm fails to account for sustainability in its activities shareholders can withdraw investments because of its reputation loss (Schrettle et al., 2014; González-Benito and González-Benito, 2009). This driver-category includes pressures coming from stakeholders, the need to maintain a competitive advantage and a good image, financial institutions, customers, investors and shareholders, as stated above (Govindan et al., 2016; Caniato et al., 2012; Freeman, 2010).

#### 2.10.8.2 *Internal Drivers*

Internal drivers are pressures within a firm that expect it to implement sustainability initiatives in the SC (Caniato et al., 2012; “González-Benito & González-Benito, 2009). These drivers are grouped into four:(1) corporate strategy (2) organisational culture (3) organisational resources (4) organisational characteristics.”

✓ Corporate strategy

The addition of sustainability standards at a planned level is the prerequisite for the effective attainment of an institution’s sustainability objectives (Schrettle et al., 2014). This driver comprises operational performance, cost-related pressures, top management commitment and an organisation’s sustainability strategy (Govindan & Jepson., 2016; Hsu et al., 2013; Xu et al., 2013).

## ✓ Organisational Culture

Organisational culture is the common values, beliefs, assumptions, and practices that define how a company runs and interacts with its surroundings (Cameron & Quinn, 2011). An organisation's culture influences its personnel's behaviour, decision-making processes, and general functioning. When it comes to SSCM adoption, an organisation's culture plays a significant part in determining whether or not it will adopt sustainable practices (Marshall et al., 2015). Marshall et al. argue that firms with a strong culture of sustainability are more likely to embrace SSCM practices because they are predisposed to making environmentally and socially responsible decisions. Yet, organisations that do not prioritise sustainability may be less likely to implement SSCM techniques because they do not consider environmental and social problems important to their operations.

A code of conduct, safety and health, innovativeness, and information dissemination are the four organisational culture factors that influence SSCM adoption (Saeed & Kersten, 2019). A code of conduct that promotes sustainability can convey to employees that the firm values and is committed to minimising its environmental impact (Saeed, Waseek & Kersten, 2017). Organizations that emphasise the health and well-being of their employees are more likely to prioritise the health and well-being of the larger community and the environment (Saeed, Waseek & Kersten). Innovativeness, or the capacity to develop new and sustainable technologies and practices, can also influence the adoption of SSCM, as inventive firms are more inclined to adopt new and sustainable practices. Lastly, information dissemination, or sharing knowledge about sustainability practices inside the company and with external stakeholders, can influence SSCM adoption as it can raise awareness and comprehension of sustainable practices and their significance (Saeed, Waseek & Kersten).

✓ Organisational resources

Schrettle et al. (2014) maintain that access to enough resources is a vital driver in attaining an organisation's sustainability objectives. Organizational resources are the assets, capabilities, and expertise a business has available to achieve its objectives (Barney, 1991). In the context of SSCM adoption, tangible and intangible resources might be distinguished (Faibil et al., 2021). A company's tangible resources include equipment, buildings, and financial resources that can be used to execute sustainable practices. For instance, a corporation may invest in energy-efficient equipment or waste management systems to lessen their environmental impact. In contrast, intangible resources refer to the knowledge, skills, and abilities of an organization's personnel, which can be utilised to adopt SSCM procedures. A corporation may, for instance, offer training and development programmes to its staff in order to expand their knowledge and abilities in sustainable practises.

The adoption and implementation of SSCM techniques require access to resources. For example, physical capital resources are required to execute environmental measures such as waste reduction, energy efficiency, and the adoption of renewable energy (Jabbour et al., 2013). Similarly, the talents and knowledge of employees can be utilised to execute SSCM techniques such as sustainable product design and supply chain collaboration (Sarkis, 2012). Moreover, organisational capabilities, such as cross-functional coordination and collaboration, are required for adopting SSCM processes that include numerous organisational functions and stakeholders (Mishra & Sharma, 2010).

Access to material and intangible resources is crucial for the implementation of SSCM. Environmental activities require tangible resources such as equipment, buildings, and financial resources, but sustainable practices involving numerous stakeholders require intangible resources

such as knowledge and skills of personnel and organisational capabilities. Thus, businesses must ensure they have the resources to implement SSCM procedures successfully.

✓ Organisational characteristics

The characteristics of an organisation are also a driver of the implementation of sustainability in a firm (González-Benito and González-Benito, 2009; Haverkamp et al., 2010). This driver includes the organisation's industrial sector, position in the SC, geographical location, degree of internationalisation, the current level of environmentally-friendly actions and size (Mzembe et al., 2016; Schrettle et al., 2014; Tate et al., 2010).

SSCM drivers are also categorised as secondary and primary based on their access to their contribution to the value and knowledge of the SC. Primary drivers comprise regulatory agents, financial institutions, customers, unions, employees, suppliers, shareholders, the government (Alblas et al., 2014; Zhu and Sarkis, 2006), the competitive advantage, resource utilisation, cost-related pressures, top management commitment (Giunipero et al., 2012) and competitor pressure (Hsu et al., 2013). Secondary drivers comprise financial benefits, certification (Giunipero et al., 2012), public/social/community pressure, socio-cultural responsibility (Hsu et al., 2013), image, reputation (Zhu and Sarkis, 2007), NGOs and the media (González-Benito and González-Benito, 2009).

### **2.10.9 Relationships between SSCM and stakeholders**

SSCM is accountable to stakeholders, who are consumers who expect socially responsible corporate behaviour (Maignan et al., 2005) and include NGOs, suppliers, media, agencies, regulators, competitors and consumers (Freeman & Reed, 1983; Buysse & Verbeke, 2003). According to Gray and Balmer (1998) and Mohr and Spekman (1994), buyers and suppliers

depend on each other for their success through the machinations of the SC, which has to follow sustainable practices including the preservation of the natural environment throughout the value chain.

Stakeholder theory emphasises the interconnected relationship between a business and its suppliers, employees, investors, shareholders and customers to whom a company is accountable and owes its existence (Freeman, 1999; Park-Poaps & Rees, 2010). In particular, according to shareholder theory, a company is obliged to use its resources to make profits to increase the wealth of its shareholders, who own the business's stock.

Stakeholders and shareholders exert internal and external pressure on firms, as noted by Park-Poaps and Rees (2010), in their research on the apparel industry. Internal pressure would come from those within the SC, such as employees, which might involve solving labour and hierarchical communication issues, whilst the media and business peers would exert external pressure (Fawcett & Magnan, 2002).

Socially responsible initiatives would integrate fair labour practices into the organisational core (Howard-Grenville & Hoffman, 2003; Andersen & Skjoett-Larsen, 2009), and developing partnerships with employees would improve internal communication (Lim & Phillips, 2008) with those lower down the SC (Park-Poaps & Rees, 2010), thereby ultimately improving job performance, production, consumer satisfaction, the corporate reputation/image and relationships with external stakeholders (Park-Poaps & Rees, 2010; Fombrun & Shanley, 1990; Fan, 2005; Caruana, 1997; Husted & Allen, 2001). In the same vein, companies' environmental responsiveness will yield reputational advantages (Fombrun & Shanley, 1990).

### **2.10.10 The Benefits of SSCM**

Incorporating environmentally-friendly initiatives into the SC leads to benefits, such as minimising pollution, gaining the marketing edge by promoting brands, products, ideas and services, which do not harm the environment, reducing costs, enhancing a company's reputation and corporate image and (Carter & Rogers, 2008; Carter & Easton, 2011; Pedersen, 2018; Liang & Chang, 2008; Ghanem, 2018). In addition, including stakeholders in a participative decision-making process when implementing environmentally sustainable strategies and addressing CSR will ensure the success of SSCM (Farahani et al., 2009).

The benefits of SSCM were summarised by Carter and Easton (2011) and Ghanem (2018) as decreasing disposal costs; enhancing product quality; reducing the workforce and turnover costs owing to safer transport and warehousing; decreasing safety and health costs; and reducing packaging through recycling. According to Florida and Davison (2001), certain social and environmental initiatives improve relationships with clients, especially those that support environmental activities in the community and involve giving donations for local environmental projects

### **2.10.11 Challenges to Implementing SSCM**

Sustainable supply chain management (SSCM) is an important approach that can help firms achieve sustainability objectives while maintaining profitability. However, many manufacturing firms in Ghana and other regions of the world face barriers to the adoption of SSCM practices. These barriers can be categorized into several groups, including institutional, operational, financial, and knowledge-related barriers.

Adoption of SSCM practices is not without difficulties, and multiple scholars have highlighted several implementation barriers. According to Linton et al. (2007), one key hurdle to the implementation of SSCM practices is a lack of senior management support. According to the

authors, top management support is required to instil a culture of sustainability inside the firm and allocate the resources required for SSCM implementation. Similarly, Carter and Rogers (2008) observed that a lack of commitment from senior management can stymie the implementation of SSCM policies, especially if managers do not comprehend the benefits of sustainable practices or regard them as a low priority.

Another impediment to the implementation of SSCM techniques is a lack of staff awareness and comprehension of sustainability issues. Employees may be resistive to change if they lack the requisite skills and knowledge to apply sustainable practices, according to Seuring and Muller (2008). According to the authors, a lack of awareness and understanding of sustainability issues among suppliers and consumers might further impede the adoption of SSCM processes. Also, according to Morali and Searcy (2010), regulatory pressures are a key impediment to adopting SSCM procedures. According to the authors, regulatory demands can develop a compliance mindset, limiting the scope of SSCM procedures to only those mandated by law. This might lead to a restricted focus on environmental issues while overlooking sustainability's social and economic dimensions.

Furthermore, Seuring and Muller (2008) claimed that a lack of communication and coordination among supply chain participants can impede the implementation of SSCM methods. According to the authors, implementing sustainable practices frequently necessitates coordination and cooperation across supply chain partners, which can be difficult without trust, communication, and common understanding. Additionally, Linton et al. (2007) said that a lack of financial resources can be a substantial barrier to SSCM practice implementation. The authors stated that implementing sustainable practices frequently necessitates large investments in technology, training, and infrastructure, which may be difficult to fund for small and medium-sized businesses.

Abbasi and Nilsson (2012) identify five challenges in making SC environmentally sustainable; mindset; operationalisation, complexity, costs and cultural uncertainties. Tanco et al. (2015) conducted a study on the main challenges hindering the SC performance of SMEs in Uruguay and found the following challenges that impede SC performance:

- Telecommunications
- Ground transportation
- Local warehouse infrastructure
- Political environment
- Market instability
- Macroeconomic factors
- Distribution problems
- Commitment of top management
- ICT
- Government policies
- Product availability

In developing SSCM, the main challenge is the high cost of environmental programmes (Van Zanten & Van Tulder, 2018). Moreover, a lack of human resources, management commitment and recycling harm SSCM development (Florida & Davison, 2001; Farahani et al., 2009). Min and Galle (2001) maintain that a lack of federal and state regulations, deficient firm-wide environmental standards and auditing programmes and insufficient awareness in suppliers and buyers prevent the implementation of SSCM.



A study conducted by Hines and Johns (2001) revealed that fluctuating market demand, strong competition, the inability to reduce suppliers' prices and low-profit margins prevent the development of SSCM.

Also, Adobor et al. (2019) report that many Ghanaian enterprises lack awareness regarding sustainable business practices requirements, making it hard for them to comply. This uncertainty can prevent SSCM adoption. Another impediment to adoption is SSCM ignorance. Many Ghanaian companies are unfamiliar with sustainability and sustainable supply chain management and may not understand its benefits.

Operational issues with SSCM implementation are another obstacle. In Ghana, small and medium-sized firms (SMEs) generally lack the financial resources and technical knowledge needed to embrace SSCM methods (Abraham, 2017). Financial obstacles can potentially hinder SSCM adoption. Without a clear knowledge of the benefits, organisations may hesitate to invest in these processes. This is especially difficult for enterprises in competitive marketplaces that must keep costs low (Owusu, 2019). SSCM adoption may also be influenced by culture. Sustainable supply chain management may contrast with established business methods and cultural norms. SSCM may be challenging to implement in firms prioritising short-term earnings over long-term sustainability (Owusu, 2019).

**Table 2.1: Challenges to implementing SSCM**

Theme/categorization	Sub issues	Source
Institutional	<ul style="list-style-type: none"><li>• Senior management support</li><li>• Regulatory pressures</li><li>• Cultural uncertainties</li><li>• Local warehouse infrastructure</li><li>• Political environment</li><li>• Commitment of top management</li><li>• ICT</li><li>• Government policies</li><li>• Lack of human resources, management commitment and recycling</li><li>• A lack of federal and state regulations, deficient firm-wide environmental standards and auditing programmes and insufficient of awareness in suppliers and buyers</li><li>• Lack awareness regarding sustainable business practices requirements</li></ul>	Linton et al. (2007); Carter and Rogers (2008); Morali and Searcy (2010); Abbasi and Nilsson (2012); Tanco et al. (2015); Florida and Davison (2001); Farahani et al. (2009); Min and Galle (2001); Adobor et al. (2019)
Operational	<ul style="list-style-type: none"><li>• Lack of staff awareness and comprehension</li></ul>	Seuring and Muller (2008); Seuring and Muller (2008); Abbasi and Nilsson (2012);

Theme/categorization	Sub issues	Source
	<ul style="list-style-type: none"> <li>• Lack of communication and coordination</li> <li>• Operationalisation, complexity</li> <li>• Telecommunications</li> <li>• Market instability</li> <li>• Macroeconomic factors</li> <li>• Distribution problems</li> <li>• Product availability</li> <li>• Fluctuating market demand, strong competition, the inability to reduce suppliers' prices and low-profit margins</li> </ul>	Tanco et al. (2015); Hines and Johns (2001);
Financial	<ul style="list-style-type: none"> <li>• Lack of financial resources</li> <li>• Costs</li> <li>• Ground transportation</li> <li>• High cost of environmental programmes</li> <li>• Lack of financial resources and technical knowledge</li> </ul>	Linton et al. (2007); Abbasi and Nilsson (2012); Tanco et al. (2015); Van Zanten and Van Tulder (2018); Abraham (2017); Owusu (2019).
Knowledge-related	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Telecommunications</li> </ul>	Tanco et al. (2015)

*Source: Author's construct (2022)*

### **2.10.12 SSCM Framework**

Establishing SSCM requires the government to prescribe regulations to force firms to adopt a minimum level of environmentally-friendly practices. In addition, firms have to understand the benefits of sustainability practices, especially that of improved economic performance, and develop a scheme to incorporate them (Carter & Rogers, 2008; Carter & Easton, 2011; Bowen et al., 2001).

According to Farahani et al. (2009) and Carter and Easton (2011), the implementation of SSCM calls for stakeholders' trust, cooperation and awareness of the benefits of ensuring socio-economic development and a sustainable environment through the activities of the SC. In addition, monitoring and assessment programmes will aid firms in amending their practices for SSCM and assist them in developing appropriate strategies and a framework (Farahani et al., 2009).

Figure 2.6 below depicts a framework for developing SSCM. The framework is based on the explanation above and information provided by Al-Odeh and Smallwood (2012). In the figure, EMS denotes Environmental Management System

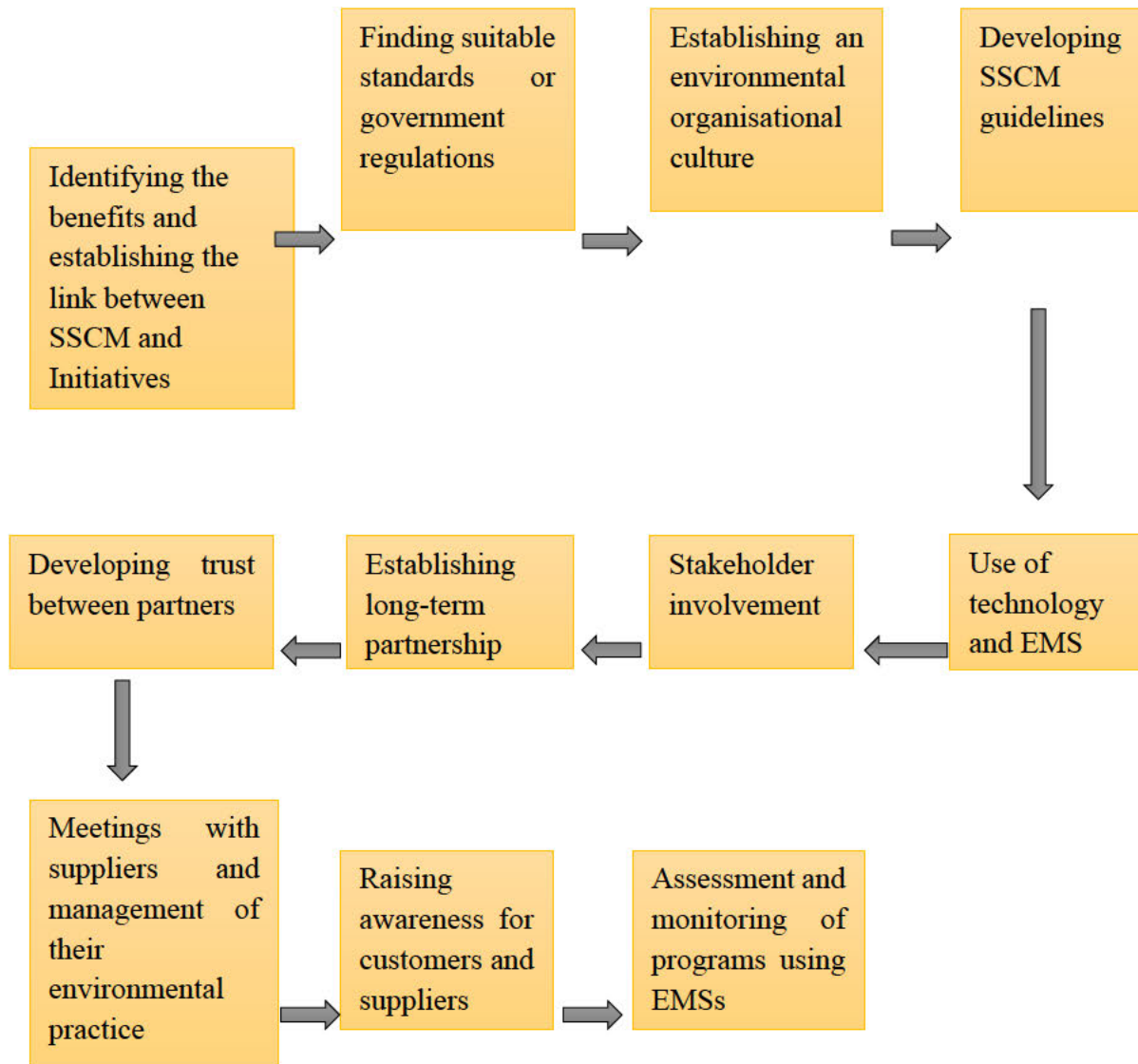


Figure 2.6: Framework for SSCM

Source: Al-Odeh and Smallwood (2012)

The development of environmental schemes will facilitate the monitoring of a firm’s SSCM through regular reports. Moreover, a firm has to strengthen its SSCM through the use of technology (Balogun, 2008) and “manage the environmental performance of its suppliers to make sure that the supplied equipment and materials are environmentally-friendly and produced by employing” environmentally-friendly procedures (Liang & Chang, 2008). Firms should organise regular meetings with their suppliers to explain the importance of SSCM, talk about their environmental

policies and direct them in developing environmental strategies (Liang & Chang, 2008). Furthermore, “three conditions are essential for SSCM development: fair pricing, long-term partnerships and a consistent level of operations (Font et al., 2008). Therefore, creating an environmentally-friendly organisational culture, which includes high moral standards and” citizenship will lead to the development of SSCM (Carter & Easton, 2011).

### **2.10.13 SSCM and the Sustainable Development Goals**

The SDGs, which were adopted by the UN in 2015 to replace the Millennium Development Goals (MDGs) of 2000, indirectly support the TBL perspective and provide orientation towards activities that can contribute to firms' sustainable performance. Therefore, the present literature on SSCM narrowly focusses on the TBL, whereas sustainability is more complex. The SDGs provide a tactical orientation towards actions, which civil society and enterprises can take to ensure sustainable development, summarise sustainability principles and point out that sustainability depends on achieving a minimum of one SDG (UN, 2018).

These guidelines can help a firm's stakeholders to drive or initiate sustainability practices in an SC, even if a bundle or series of actions and material arrangements contribute towards only one SDG. Moreover, each SDG is dependent on the achievement of other goals. For instance, SDG 1, which is “no form of poverty anywhere” depends on economic growth and the explanation for this goal articulates that “economic growth should be inclusive of promoting equality and offering sustainable jobs' (UN, 2018). This suggests that sustainability will be achieved if all the SDGs are not only achieved but also maintained over time. Thus, SDGs should be regularly accomplished in different areas through a nexus of sustainability practices in the SC of a firm, for example.

The SDGs comprise 169 targets and 17 goals (UN, 2019). Some of these integrated the previous MDGs, while others were new (Pedersen, 2018). Griggs et al. (2013) highlight that since then,

there have been propositions for reviewing sustainable development to comprise the security of the planet and the people through SDGs where MDGs are integrated with science-based worldwide environmental targets and existing international agreements.

In 1987, the Bruntland Commission issued its report entitled *Our Common Future* to reconcile the concerns of environmental stability and economic development and ensure "development that meets the needs of the present generation without jeopardising the rights of generations to come" (UN, 1987). This view of sustainable development supports economic growth and the long-term protection of the environment and the social well-being of current and future generations (UN, 1987; Griggs et al., 2013). Le Blanc (2016) maintains that although the SDGs are more integrated with one another than the MDGs were, policies and strategies for their implementation need to be developed and integrated with those of the MDGs.

According to Le Blanc (2016), the SDGs have two vital directives: i) to support and connect environmental and social priorities, and ii) to give companies clear procedures for tackling them, which is indicated in the 2030 Agenda for Sustainable Development. A partnership between firms citizens, civil society, the private sector and governments will expedite SSCM and the incorporation of the SDGs into, for example, a manufacturing firm's activities, such as good governance, enhancing conditions in the workplace, maintaining environmental standards and meeting the demands of external verification and valuation of the manufacturing process. A manufacturing firm would have to recognise the internal and external pressures and the barriers it faces to devise strategies for practising SSCM and achieving the SDGs with the resources at its disposal.

## 2.11 Sustainability and the Fourth Industrial Revolution

Wiengarten and Longoni (2015) report that after the first three industrial revolutions due to the invention of the steam engine to mechanise transport and production, electric power for mass production and automated technology in production, respectively, the Fourth Industrial Revolution or Industry 4.0 introduced ICT, the networking of production systems, people and components and smart factories. Brettel et al. (2014) explain Industry 4.0 as the decentralisation of business procedures as a result of technological advances. “Brettel et al. (2014) add that Industry 4.0 is characterised by technological innovations, such as Big Data Analytics (BDA), artificial intelligence (AI), cyber-physical systems (CPSs), the Industrial Internet of Things (IIoT), additive” manufacturing (AM), complex control systems (CCSs) and machine to machine (M2M) communication.

According to Oberg and Graham (2016), Industry 4.0 denotes a business setting where enterprise systems, devices, machinery and employees are linked through the Internet and CPSs. Moeuf et al. (2017) maintain that “this industrial transformation has permitted smart process management and has offered new paradigms for industrial management.” Industry 4.0 enabling technology allows for dynamic and autonomous manufacturing (Fatorachian & Kazemi, 2018; Tortorella & Fettermann, 2017), and the transformation of control networks in business, which have enhanced services and products provided by firms (Porter & Heppelmann, 2014). In addition, Strozzi et al. (2017) mention that these technological innovations permit the effectual usage of resources and ensure sustainable performance in smart factories.

Golini, Longoni, and Cagliano (2014), Jabbour et al. (2012) and Ludbrook et al. (2019) mention that manufacturing firms have realised the importance of the TBL when investing in technology, especially that which incorporates environmental protection in the system.



Nonetheless, Golini, Longoni, and Cagliano (2014) report that the TBL model in a smart “manufacturing system can be instituted only when each site is part of the network and not a standalone operation. Moreover, manufacturing firms may carry out environmental practices as a preventive measure with an emphasis on eco-efficiency, which may limit their prospective” competitiveness despite the positive effect on flexibility, delivery, cost, and quality (Jabbour et al., 2012; Udell et al. 2019). Graessley et al. (2019) mentioned that a systemic incorporation of environmental management practices into the SC would ensure sustainability.

Jabbour et al. (2014), Golini, Longoni, and Cagliano (2014), and Nascimento et al. (2019) conducted studies on the connection between Industry 4.0 and the TBL by investigating whether networked manufacturing accomplishes fundamental, traditional manufacturing priorities (flexibility, delivery, cost, quality and dynamic systemic development). As Rosa et al. (2019) maintain, traditional manufacturing models lack delivery, flexibility and dynamic systemic development, and in a traditional peripheral manufacturing plant model, a manufacturing facility is a standalone system, unlike CCSs, for example, which involve robotic control of multiple systems (Herrmann et al., 2014; Golini, Longoni & Cagliano, 2014; Alcacer & Cruz-Machado, 2019).

Herrmann et al. (2014) note that energy inputs (oil, gas, electricity) are taken by standalone manufacturing plants to drive machines and transform raw materials into finished goods. Such systems produce harmful emissions, waste and heat, which either harm the environment or make working conditions unbearable for staff. In addition, although these plants have been successfully and extensively used across, they do not ensure TBL sustainability and therefore an ecosystem model based on Industry 4.0 technology should be adopted to ensure green production (Golini, Longoni and Cagliano, 2014; Alcacer and Cruz-Machado, 2019). Herrmann et al. (2014) maintain

that by following this model, plants will be optimally efficient in terms of mass production because they operate at multiple levels rather than being based on a single manufacturing plant producing the maximum amount of products of which it is capable, which might not be enough to meet customer demand (Alcacer and Cruz-Machado, 2019).

TBL objectives are achieved by this model as the per-plant consumption of natural resources, and energy decreases considerably, and the stress on workers decreases. According to Herrmann et al. (2014) and Alcacer and Cruz-Machado (2019), an “Industry 4.0 design calls for a transformation in multiple facets of a manufacturing plant, like modularity in design, universality, mobility, compatibility and scalability. For instance, small plant sites in the vicinity of end-users are desired over remote and large manufacturing plants (Rauch et al., 2015). Shim, Park and Choi (2017) mention that plants with modularity are capable of mass customisation and are preferable to non-modular and inflexible assembly lines capable of mass manufacturing. Work stations and machinery are set up to auto-adjust to bottlenecks and varying lot sizes and workloads. In addition, they can deal with multiple product designs, follow complex heuristic production scheduling rules and can process a blend of multiple despatching regulations, such as slacking rules, minimum setup rules, modified due-date rules, and first in first out principles (Shim, Park and Choi, 2017). An Industry 4.0 design effectually backs the ReSOLVE (regenerate, share, optimise, loop, virtualise, and exchange) model of a sustainability-friendly economy, also known as the circular economy (De Sousa et al., 2018).”

De Sousa et al. (2018) explain a five-step approach to accomplishing the ReSOLVE model of a circular economy, which follows an SSCM framework whilst making use of appropriately chosen Industry 4.0 technologies and collaboration amongst SC stakeholders to accomplish well-defined achievable targets and performance indicators. Moreover, value creation is needed in an Industry

4.0 design for a circular economy. This is accomplished through continuous improvements to performance measurement, practices, processes and technologies (Nascimento et al., 2019; De Sousa et al., 2018). In addition, shared manufacturing activities and energy resources regeneration amongst multiple facilities for boosting per plant energy usage can be accomplished through multi-plant processes and careful monitoring and measurement of the Industry 4.0 design (Herrmann et al., 2014; Alcacer and Cruz-Machado, 2019).

The loop part of the ReSOLVE model calls for infrastructure for the recycling of manufactured goods reaching the end of their life cycle (Nascimento et al., 2019; De Sousa et al., 2018). Nascimento et al. (2019) report that this process includes the careful sorting and storage of reusable materials, treating them for reusability and feeding them into a system of remanufacturing for reusability. The exchange and visualisation parts of the ReSOLVE model call for the virtual integration of flow-based manufacturing procedures spanning across multiple plants placed worldwide (Herrmann et al., 2014).”

Rosa et al. (2019) conducted a study that found AM, which involves industrial 3D printing, and the IIoT is the most useful Industry 4.0 technologies for the circular economy. Moreover, the TBL model can be sensed by the IIoT, which provides the required data through AI and BDA to examine the critical problem areas for enhancement. The IIoT in the form of CPSs facilitates multiple improvements in the SSCM of excessive waste and the recycling of goods and materials. In addition, AM contributes to a circular economy because it does not use resources or leave waste. The success of SSCM based on an Industry 4.0 system depends on the efficacy of each process and equipment, such as processors, machinery, robotics and control systems, that play a role (Yazdi et al. 2018; Alcacer and Cruz-Machado, 2019). Waste and emission reduction and efficient production are the main aims of SSCM based on an Industry 4.0 design. Yazdi et al. (2018)

emphasis that factors affecting efficacy are availability (total runtime/planned production runtime), quality (total goods/planned), and performance (total cycles implemented/planned cycles). “These factors can be investigated by carrying out a time-series analysis of machine-created data on what is taking place in each component, such as the processor, machine, robot and control system, in the process cycle (Zhong et al., 2017; Sivri and Oztaysi, 2018). Modifying these factors can aid in accomplishing the TBL objectives because the total intensity of several” variables, such as heat generation, emissions, stress experienced by workers, waste, natural resources and energy consumption, will decrease with squeezed timelines (Kiel et al., 2017; Ren et al., 2019).

An “Industry 4.0 model ensures a lean manufacturing culture and the realisation of TBL objectives (Yazdi et al., 2018; Kiel et al., 2017; Resta et al., 2016; Iranmanesh et al., 2019). In an Industry 4.0 system, the daily operating performance and maintenance reports of each component, like a robot, machine, and controller, are observed remotely by collecting real-time pertinent data from the IIoT sensors (Zhong et al., 2017; Sivri & Oztaysi, 2018). The urgent repairs or next maintenance cycle of a component is determined dynamically based on its current and past performance compared with other similar components (Ren et al., 2019).”

To sum up, Industry 4.0 has contributed to effective environmentally-friendly manufacturing in worldwide virtual and cloud-based plants (Perez-Lara et al., 2018; Lu et al., 2019). Moreover, the ReSOLVE model ensures circular economy variables, sustainable procurement, green supply chain management, clean production and design for the preservation of the environment. The technology of Industry 4.0, such as AI, AM, cloud manufacturing, BDA and CPSs, allows the real-time visualisation of actuator capabilities to inform automated operations decision-making, the prioritisation of targets, task optimisation and maintenance, automated fault detection, correction and prevention capability and other aspects of manufacturing, which were not possible with

Industry 3.0 (the Third Industrial Revolution). The cyberspace of Industry 4.0 permits the flow-based networked implementation of manufacturing processes, which, in SSCM, embrace the TBL principles.

## **2.12 Empirical review**

This part of the literature review covers empirical studies on SSCM. The review supports the claim that SSCM brings about environmental, social and economic benefits to companies that partake in sustainable corporate activities (Vasileiou & Morris, 2006; Kaufmann & Carter, 2010; Mefford, 2011). According to the literature, economic benefits include reduced financial risk, decreased costs, increased sales and improved returns/profits for shareholders (Kaufmann & Carter, 2010; Mefford, 2011). Kaufmann and Carter (2010) maintain that SSCM in developing countries leads to improved supplier management skills, a better reputation, supplier strategic capabilities, and supplier operational performance.

SSCM has gained a lot of traction in today's competitive business climate for various industries (Islam et al, 2020). However, industry owners face several difficulties when attempting to integrate sustainability practices into their SC. Islam et al.'s (2020) study found several interrelated challenges facing Bangladesh's leather sector. Five leather and footwear industry professionals from export-oriented firms were chosen to identify the most pressing issues. A decision-making trial and evaluation laboratory (DEMATEL) approach was used to examine the link between the 18 identified difficulties and classify them into categories, such as cause and effect. The causal challenges identified were a lack of knowledge, experience and technical expertise, corruption, ignorance of social concerns, inadequate adoption of technology and insufficient training in SSCM, the absence of eco-literacy among supply chain players, finance restrictions, government norms and regulations, costs, capacity constraints and the demand for lower prices.

Organisational activities that have a detrimental effect on the environment have prompted an increase in research on sustainability, such as that of Baah and Jin (2019), who wanted to shed light on how SSCM impacts the performance of logistics companies. In addition, the research investigated the intermediate role of competitive advantage in the link between SSCM and organisational performance. A total of 190 logistics managers were asked to complete surveys to gather data. SSCM has a strong and favorable impact on organisational performance according to the results of data analysis. Indirectly, competitive advantage has a substantial influence on the link between SSCM and organisational performance. The study found that sustainability integration in SCM has an impact on an organisation's performance in today's commercial and industrial environment. Managers could use this finding to initiate SSCM and academics could use it in their research.

Qorri, Gashi and Kraslawski (2021) quantitatively researched possible moderators of the “relationship between SSCM practices and firm performance. The study relied on data from 145 separate samples of 33,886 companies. Meta-analytical approaches were used to evaluate the validity of the study hypotheses. The findings revealed that SSCM practices are strongly and positively connected with the social, operational, economic and environmental performance of firms.”

Wang and Dai (2018) found that SSCM practices, which involved internal and external management, had a substantial “influence on the performance of Chinese enterprises. The researchers analysed the influence of SSCM practices on a firm's performance from all angles using a conceptual model and partial least squares structural equation modelling (PLS-SEM) to examine the effects of SSCM practices on the economic, environmental and social performance of 172 Chinese enterprises. The findings revealed that the environmental and social performance of

the companies was enhanced as a result of their internal SSCM practices. Furthermore, environmental and social performance was significantly correlated with economic performance. According to the findings of this study, SSCM practices are environmentally, socially and” economically beneficial both within and outside a firm.

Mefford (2011) reports that SSCM results in higher sales, as customers prefer ethics. Moreover, modern production theory proposes that SSCM allows a company to have a cost-competitive advantage (Kaufmann & Carter, 2010; Mefford, 2011). SSCM also positively influences employee behaviour, which leads to increased production and profitability. This is because workers value a pleasant, supportive working environment and safe work conditions in a firm that promotes sustainability, which leads to employee retention and job satisfaction (Kaufmann & Carter, 2010; Mefford, 2011). Mefford (2011) and the UN Global Compact, which promises to encourage firms to promote sustainability (UN, n.d.), maintain that SSCM can decrease financial risk, lower costs and increase revenue.

Hamprecht et al. (2005) demonstrated the importance of the TBL in a food SC by investigating the promotion of environmental, social and economic sustainability in the Swiss Nestlé Company Limited. The authors found that SSCM practices did not produce new skills, although they ensured improved business capabilities. Also, Vasileiou and Morris (2006) carried out a case study to examine the performance of an SC network in terms of environmental, social and economic sustainability by gathering data from retailers, merchants and growers of fresh potatoes in the UK. The study aimed to identify and describe the key participants’ perceptions of sustainability; sustainability drivers; the way perceptions change over time; the degree to which sustainability drivers had changed over time; and the extent of the conflict or cooperation between these drivers. Data were gathered through the use of a postal survey on the following:

- The nature and scalability of the potato industry
- The perceptions of respondents of the importance of sustainability in making decisions about profitability
- Business uncertainty and environmental pollution
- The effect of external agents like regulatory organisations and markets on decision making
- The effect of factors, such as business uncertainty, natural resources availability and labour supply on decision-making.
- Organisational practices promoting sustainability.

At the initial phase of the study, questionnaires were sent to 1000 registered potato farmers, and 240 were completed and returned. In addition, out of the 28 potato merchants who had been sampled, 17 completed and returned their questionnaire. Out of the eight retailers sampled, four completed and returned their questionnaire.

The results of the data analysis revealed improving workers' skills resulted in environmental and financial benefits, and decreasing environmental risks offered financial benefits. Moreover, the study revealed the effect of factors, such as climate, food quality market requirements, and profitability. Additionally, a synergy between the sustainability variables was observed, although the environmental and economic variables factors were strongly related as were the environmental and social variables. The researchers concluded that staying in business and maintaining a competitive edge lead to economic success, although environmental and social concerns should be priorities too. The recommendation was that the study findings should be used to improve business performance and to inform decision-making.



Markley and Davis (2007) studied how SSCM could build a future competitive edge for a business aimed to determine the most practical sustainable practices. They formulated hypotheses based on the SC, green logistics, management strategy and accounting theory:

- a. SSCM is positively associated with social/ethical outcomes and high social/ethical ratings in a company
- b. SSCM is positively associated with environmental outcomes and high environmental ratings in a company
- c. SSCM is positively associated with high stakeholder ratings in a company
- d. High employee and customer satisfaction ratings are positively associated with a company's profitability
- e. SSCM is positively associated with a company's profitability

The study modified the TBL into ethical/social outcomes, which were measured by employee and customer satisfaction, CSR ratings and ethical/social ratings; environmental outcomes, which were measured by the US Environmental Protections Agency (EPA) and Innovest ratings of recycling efforts and pollution control; and financial outcomes in terms of competitive advantage. Tobin's Q, ROI and ROA were used to measure competitive advantage, although they were used before as fiscal measures.

Sustainability was also assessed using sustainability ratings of organisations taken from the Global 100 Most Sustainable Corporations and Corporate Knights indexes. Information from GlobalScan, the Cooperative Bank and the New Economics Foundation was used as a measure of ethical ratings. In addition, financial data were obtained from Compustat and the published performance reports and financial statements of the companies in the study. After the data analysis, the researchers proposed that when a company started to lose the competitive edge, it should search

for new areas where it might have a competitive advantage, which should be exploited by focussing on environmental and ethical/social sustainability and not just financial profits.

Carter and Rogers (2008) built an SSCM framework to demonstrate the concepts of environment, social and economic sustainability that a company should promote in its culture, and strategy, whilst ensuring transparency and managing risk to attain long-term benefits. The SSCM framework was underpinned by the resource-based view and resource-dependence theory, population ecology, and transaction cost economics.

Data were gathered from 35 SC executives and managers from 28 Fortune 1000 firms in Germany and the United States. The study results led to recommendations for managers and further research, including improvement to and testing of the researcher's SSCM framework. The research results revealed that even though sustainability is promoted by managers, the understanding of the sustainability concept differs amongst SC personnel.

Awaysheh “and Klassen (2010) explore the incorporation of social sustainability in SCM by using a series of scales to measure multiple dimensions of supplier socially responsible practices. The” study aimed to determine factors affecting a firm's socially responsible performance and CSR, such as community participation and transparency. Data were gathered from supplier personnel in the transportation industry, which is classified by the North American Industrial Classification System (NAICS) as Code 336, in the chemicals industry (NAICS Code 325) and the food industry (NAICS Code 311). These industries were selected based on their SC network, social outlook and their competitiveness. A total of 335 survey questionnaires were distributed to personnel in the transportation industry, 300 to employees in the chemicals industry and 574 to food industry staff. Only 307 questionnaires were completed and returned indicating a 25% response rate.

A set of linear models was employed to study the relationship between the SC structure and the “implementation of four socially responsible practices by suppliers. The data analysis results revealed that enhanced transparency, as shown in greater product visibility for the end customer was linked to increased consideration of the human rights of suppliers, which would ultimately” protect a company’s brand.

Kaufmann and Carter (2010) conducted a study on how a firm’s promotion of social and environmental sustainability drives long-term profitability in developing countries (the Czech Republic, India, Hungary, Brazil and China), firm size and diverse industries (trade, mechanical engineering, electronics, consumer goods, pharmaceuticals, chemicals and the automotive sector). The study aimed to determine the benefits gained by implementing SSCM by examining six areas of social and environmental sustainability practices: community development, safety standards and working conditions (social dimensions), production input factors, end-of-pipe filtering and resource efficiency (environment dimensions). The companies’ performance in these areas was measured according to their internal operations.

The results revealed that financially successful companies contribute to sustainability more than unsuccessful companies do. In addition, companies that strongly promote social and environmental sustainability through their activities have a competitive edge, the support of the community, satisfied employees, a good reputation, innovation capacity and an effective production system.

The investigation demonstrated significant variations in the sustainability practices of the internal operations of the sampled industries. The electronics, engineering, mechanical and automotive businesses focussed more on activities that enhance safety standards and working conditions but less on community improvement. The consumer goods industry and pharmaceutical and chemicals businesses focussed on activities that enhance safety and working conditions, whilst consumer

goods businesses also focussed on environmental sustainability. In mechanical engineering and automotive businesses, supplier development was of major significance, while environmental protection measures were of major significance to the electronics business. The consumer goods businesses focussed on selecting suppliers whose operating conditions would promote sustainability, while safety facets dominated the pharmaceutical and chemicals businesses.

The study also investigated SSCM in terms of promoting sustainability in supplier management (supplier development, monitoring and selection). The results revealed a strong relationship between competitive advantage and enhancing sustainability in supplier practices. The competitive advantage was reflected in the improvement of firm reputation, supplier management skills, supplier strategic abilities and supplier operational performance. Based on the study outcomes, it was proposed that managers should prioritise environmentally-friendly practices over social responsibility because it would improve relationships with suppliers and improve their skills.

Golini et al. (2012) assesses the relationship between a firm's performance in being socially responsible and protecting the environment with three other variables: SCM improvement, SSCM initiatives and global sourcing strategies executed by firms while controlling internal sustainability programmes. They put forward that SSCM initiatives explain the variations in firms' social and environmental sustainability performance, which is moderated by a global sourcing and SCM improvement programs. To examine the aforesaid proposition, data were obtained from the 2009 fifth edition of International Manufacturing Strategy for a 400-plant global sample. The data were on firm performance, competitive strategy, production network configuration and firm size.

An "exploratory factor analysis was conducted, the Kaiser-Meyer-Olkin measure was used to assess the sampling adequacy, and Bartlett's test of sphericity was used to check the convergent and discriminant validity of the quality of the instruments. To achieve the study results, a linear

regression was employed. At this point, two models were formulated. The first model measured the influence of SSCM on fiscal performance for the previous three years; and the second model compared fiscal performance with competitors in implementing SCM improvement programmes and the interaction between SCM improvements and SSCM initiatives.”

All “the models were controlled for gross national income (GNI), size and CSR initiatives. The study results demonstrated that except for size, all the control variables significantly affected both measures of performance. There was a positive relationship between the level of the companies' investment in SSCM initiatives and their social and environmental performance. SCM improvement programmes had a positive impact on the direct relationship between SCM initiatives and the sustainability performance of a firm, global sourcing had a negative impact on the relationship between SCM investments, SSCM initiatives and sustainability performance. The researchers concluded that firms with global suppliers perform better than firms that depend on local suppliers, but this can only be accomplished with a strong SSCM.”

Colicchia et al. (2011) conducted a study on SSCM currently implemented in firms and aimed to determine which sustainability pillar is most prevalent in their practices. In addition, they aimed to determine the standards used by the firms in setting initiative priorities within the same SC stage with a particular focus on the environmental sustainability dimension. The sample consisted of 10 big multinational firms, including Tenaris, Pirelli, Nestlé, Levi Strauss and Co, Kimberly Clark, the Fiat Group, Ikea, Henkel, Electrolux and Coca-Cola HBC. The sample was based on their location, tendency towards green initiatives, periodic environment strategy reports and environmental sustainability operations.

A three-pronged research method was employed. Firstly, a framework was designed to identify SSCM initiatives based on the literature. The framework consisted of five stages: product design,

warehousing, the external SC, the internal SC and green procurement. Initiatives typically used to enhance environmental sustainability were formulated for each of the stages based on the literature. Secondly, the framework was used to investigate the firms' company environmental reports (CERs), which were available on their internet sites, and understand their environmental initiatives at each stage of the SC, thereby evaluating the extent of their sustainability awareness issues

Thirdly, three firms, Nestle, Electrolux and Coca-Cola HBC, were chosen for interviews based on their environmental responsiveness and client interest in their sustainability initiatives. The environmental managers and/or SC managers, operating in three of the chosen firms in Italy were interviewed. The data analysis revealed that packaging/product design was foremost amongst the SSCM practices, while initiatives tackling outbound SC and warehousing appeared to be less represented. Moreover, the study findings revealed considerable variability in the type and extent of environmental sustainability initiatives carried out by the companies. In particular, it was revealed that firms were progressively implementing SSCM, which indicated that the environmental initiatives would be gradually realised in all the companies. The study made recommendations for industry and academia in terms of the monitoring, design, and measurement of SSCM practices and impacts. Furthermore, the study recommended that future research should investigate sustainability operations and the industry SC network.

Multinational corporations need to ensure that the operations of their global supply chains promote environmental and social sustainability in their operations to gain the competitive advantage (Golini, Longoni & Cagliano, 2014) and profit due to improved performance and on-site competency in skills beyond those required for production, which makes the world a better place.

**Table 2.2: Performance Effect of SSCM Adoption**

Findings	Source
SSCM in developing countries leads to improved supplier management skills, a better reputation, supplier strategic capabilities, and supplier operational performance.	Mefford (2011)
The findings revealed that SSCM practices are strongly and positively connected with firms' social, operational, economic and environmental performance.”	Qorri, Gashi and Kraslawski (2021)
The study found that sustainability integration in SCM has an impact on an organisation’s performance in today's commercial and industrial environment. Managers could use this finding to initiate SSCM, and academics could use it in their research.	Baah and Jin (2019)
The findings revealed that the companies' environmental and social performance was enhanced due to their internal SSCM practices. Furthermore, environmental and social performance was significantly correlated with economic performance.	Wang and Dai (2018)
The study found that SSCM practices did not produce new skills, although they ensured improved business capabilities.	Hamprecht et al. (2005)
The results of the study’s analysis revealed improving workers' skills resulted in environmental and financial benefits, and decreasing environmental risks offered financial benefits. Moreover, the study revealed the effect of factors such as climate, food quality market requirements, and profitability.	Vasileiou and Morris (2006)
The research results revealed that even though managers promote sustainability, the concept of sustainability differs amongst SC personnel.	Carter and Rogers (2008)
The data analysis results revealed that enhanced transparency, as shown in greater product visibility for the end customer, was linked to increased consideration of the human rights of suppliers, which would ultimately” protect a company’s brand.	Awaysheh and Klassen (2010)

Findings	Source
The results revealed that financially successful companies contribute to sustainability more than unsuccessful companies do. In addition, companies that strongly promote social and environmental sustainability through their activities have a competitive edge, the support of the community, satisfied employees, a good reputation, innovation capacity and an effective production system.	Kaufmann and Carter (2010)
There was a positive relationship between the level of the companies' investment in SSCM initiatives and their social and environmental performance	Golini et al. (2012)
It was revealed that firms were progressively implementing SSCM, which indicated that all the companies would gradually realise the environmental initiatives. The study made recommendations for industry and academia in terms of the monitoring, design, and measurement of SSCM practices and impacts. Furthermore, the study recommended that future research should investigate sustainability operations and the industry SC network.	Colicchia et al. (2011)
<i>Source: Author's construct (2022)</i>	

### 2.13 Conceptual framework for SSCM

SSCM consists of a firm's internal practices, which include process design and a sustainable product, and external practices, such as collaboration between a provider and a consumer, which ensures that the SC is based on the three pillars of sustainability (Seuring & Muller, 2008). Section 12 of the UN SDGs encourages firms to embrace “sustainable practices and to incorporate sustainable information in their reporting cycle (Paulraj et al., 2017). This implies that manufacturing firms and all production systems should make efficient use of natural resources, control waste generation through prevention, reduction, reuse and recycling and minimise”



chemical emissions to the soil, water and air to lessen their health implications for the environment and humans.

When SCM equally integrates the three pillars of sustainability, society, the environment and the economy, it becomes SSCM is achieved. Markman and Krause (2016) observe that SSCM practices are based on two indivisible ethics: (i) SSCM practices have to improve ecology, adhere to ethical principles to promote social justness and enhance economic vigour; and (ii) SSCM has to give precedence to the environment, followed by society and then economics.

SSCM practices comprise the following (Easton, 2011, Paulraj et al., 2017):

- Sustainable product design, which involves energy reduction, reuse, recycling, material recovery; the use of environmentally-friendly materials and easy disassembly
- Sustainable process design, which involves targeting sustainability goals, evaluating processes to minimise their environmental impact and enhancing the environmentally-friendly production)
- Supply-side sustainability collaboration, which involves teaming up with suppliers to attain sustainability goals, meeting suppliers' requirements for the sustainability of their processes and collaborating with suppliers to provide services/products that support sustainability objectives
- Demand-side sustainability collaboration, which involves liaising with clients to attain sustainability goals, enhance their sustainability initiatives and provide services/products that back sustainability objectives

SSCM practices can lead to improvements in the following areas (Ameer & Othman, 2012, Hofer et al., 2012):

- (i) Environmental performance (e.g., improvement of a firm's environmental impact and reduction of waste, air pollution and the use of natural resources)
- (ii) Economic performance (e.g., reduction of costs for purchased materials, energy use and waste discharge and the growth of sales and profits)
- (iii) Social performance (e.g., improvement of customer satisfaction, a firm's image in the customer's eyes, stakeholder welfare)

Firms are influenced by many factors to adopt SSCM, such as every party or individual partaking in the business activities wanting to receive benefits, as proposed by stakeholder theory. Factors influencing firms to adopt SSCM include the following (Roberts, 2003, Seuring & Muller, 2008; Bjorklund, 2011):

- (i) Instrumental factors (e.g., to prevent poor publicity, satisfy shareholders and attain short- and long-term profitability)
- (ii) Relational factors (e.g., to distinguish the firm from other competitors, to multiply the customer base and heed sustainability regulations and community pressure)
- (iii) Moral factors (e.g., to do what is correct owing to concern about the environment)

Contingency theory suggests that SSCM is influenced by several external and internal factors (Donaldson, 2001), whereas institutional theory stresses that social structure, comprising routines, norms, rules and schemas, is an external factor influencing individual and firm behaviour (Oliver, 1991). Furthermore, Wernerfelt (1984) and Barney (1991) mention that to gain and maintain a competitive edge, companies must have imperfect, rare, valuable and non-substitutable resources, which is the resource-based view (RBV).

Firms have to ensure the following preconditions for SSCM success (Carter & Rogers, 2008, Morali & Searcy, 2010, Asare & Prempeh, 2016):

- Transparency
- Knowledge and information
- Capital investment commitments
- Supplier monitoring
- Risk management
- Alignment of corporate strategy with SSCM initiatives
- Loyalty and commitment to the SC
- Sufficient funds
- Adequate technology
- Adequate infrastructure
- Experienced personnel
- Contribution towards research and development

The conceptual framework for SSCM is illustrated in Figure 2.7 below.

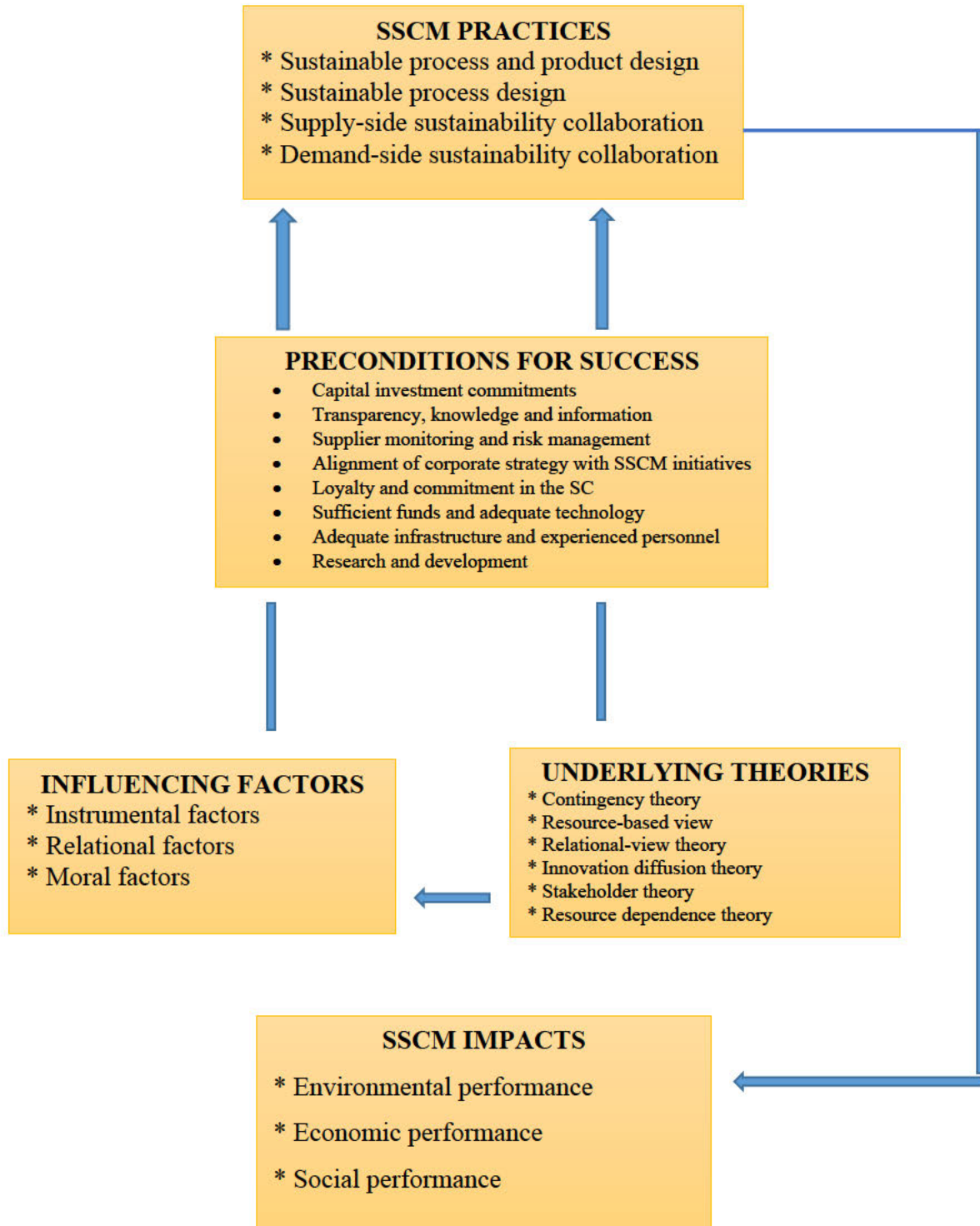


Figure 2.5: Conceptual framework for SSCM practices

Source: Researchers' own construct (2022)

## **2.14 Manufacturing sector in Ghana**

This section of the chapter provides an insight into research on manufacturing firms' financial difficulties in Ghana and their contribution to economic growth. Manufacturing firms prepare and process raw materials or use already prepared commodities/components to fabricate intermediate goods used in the process of production or finished products for sale to clients (Bartlesman & Gray, 1996; Nti, 2015).

In Ghana, the manufacturing sector comprises 16 out of the 33 subsectors listed in the International Standard Classification of Industries (ISIC). In 2013, the manufacturing value-added (MVA) of Ghana was 6% of its GDP. The manufacturing industry has declined over the years, losing over 40% of its 10% share in 2006, as opposed to the oil and services industries, which have developed at the expense of agriculture and manufacturing. Excluding the 17% growth rate in 2011, the average growth rate of the manufacturing sector was approximately 2% from 2006 to 2013. In ascending order, the five topmost manufacturing subsectors in Ghana are textiles (9%), other non-metallic products (9%), chemicals and chemical products (13%), paper and paper products (19%) and food and beverages (30%). However, employment statistics and manufacturing output in Ghana are fully reported to international agencies.

The last time an industrial survey was carried out in Ghana was in 2003 when it was found that approximately 27,000 manufacturing firms employed about 244,000 individuals. Only 4% of the manufacturing firms were large enterprises employing more than 100 people; 9% were medium-sized enterprises employing between 20 and 99 people; 36% were small enterprises employing 5 to 19 people, and 51% were micro-enterprises employing less than four people. Of those employed in Ghana, large enterprises accounted for 34%, SMEs employed 51% and micro-enterprises accounted for 15%. The majority of the firms were situated in the Ashanti and the Greater Accra

regions. The Ashanti region had 24% of the firms and 24% of employees, while Greater Accra had 25% of the firms and 27% of the employees (Addo, 2017, Adarkwah et al., 2018).

The 2003 National Industrial Census revealed that approximately 50% of manufacturing workers were unskilled employees or apprentices, approximately 40% were skilled employees and 5% were managerial and professional staff. A study conducted by Adarkwah et al. (2018) revealed that in Ghana's manufacturing industry, there is a shortage of ICT, quality control, electrical and mechanical engineering, craftsmanship and artisan skills. Therefore, several firms rely on skilled personnel from Togo, India and South Africa, for example. In addition, the Census reported that 10% of employees in manufacturing firms were foreigners, although it did not categorise them according to the levels of their skills. It is common for firms in Ghana to bring in foreign experts to install and repair equipment at a high cost.

A lot of firms run in-house training programs, but they also send their staff for expert training provided by business associations and regulators. Adarkwah et al.'s (2018) study emphasises that although employees are willing to learn, training costs can be high considering the many personnel that requires training and expenses for transportation, food and per diem allowances. Adarkwah et al.'s (2018) remark that the education system in Ghana does not train graduates in the skills needed by firms, unlike Vietnam and Kenya, which are also middle-income economies. In East Asia, Vietnam, and East Africa, Kenya, there are key manufacturing centres. In the 2015 World Bank DBR, Ghana was placed higher than these countries and ranked 70<sup>th</sup> out of 189 nations, compared to Kenya, which was placed 136<sup>th</sup> and Vietnam, which placed 78<sup>th</sup> (Adarkwah et al., 2018). Nonetheless, the 2014 World Bank Enterprise Survey reported that the manufacturing sector in Ghana encounters considerable business difficulties (Nti, 2015) due to corruption, trade and customs regulations, access to finance, electricity outages leading to high generator costs, and tax

rates, compared to Vietnam and Kenya. The following statistics illustrate the percentage of firms that consider perceiving the challenges a problem:

- Corruption (40% in Ghana, 5% in Vietnam and 25% in Kenya)
- Financial accessibility (57% in Ghana, 10% in Vietnam and 25% in Kenya)
- Electricity outages (70% in Ghana, 10% in Vietnam and 35% in Kenya)

Ghana relies on imported products, although the manufacturing sector is orientated towards the domestic market and must export enough products to make up a considerable part of the country's imports. The 2014 World Bank Enterprise Survey reported that manufacturers in Ghana approximately 90% of total sales are domestic, and not more than 25% of manufacturing companies export their products, with export sales being 1% of total sales. Moreover, approximately 50% of products are imported, and only 11% have globally recognised certification. However, Kenyan manufacturers are less reliant on imported goods and are export-oriented.

Ghana competes in the worldwide economy mainly using natural resources and unskilled labour, which is revealed by the low rating of its manufacturing industry on the World Economic Forum's Global Competitiveness Index (GCI). Between 2014 to 2015, the GCI placed Ghana 111<sup>th</sup> out of 144 nations, whereas Vietnam was placed 68<sup>th</sup> and Kenya 90<sup>th</sup>, which was explained by Ghana performing poorly in indicators, such as the labour market, which demonstrates rigidity, training and education, macroeconomic conditions, infrastructure and the. The quality of education and the level of personnel training were measured to be lower in Ghana than in Kenya. In addition, the GCI placed Ghana 137<sup>th</sup> for flexibility of wage determination, whereas Kenya was placed 69<sup>th</sup>. In Kenya, redundancy cost an average of 7 weeks of salary compared to 51 weeks in Ghana.

The Enterprise Survey reported that Ghanaian manufacturers lost 13% of annual sales because of electricity outages, compared to 1% in Vietnam and 5% in Kenya. Electricity generated from

generators by manufacturing firms in Ghana was 10% compared to 3% in Vietnam and 7% in Kenya. In manufacturing, capacity utilisation was approximate 60% in Ghana, compared to 75% in Vietnam and 70% in Kenya. The government's heavy borrowing on domestic fiscal markets, persistent budget deficits, current account deficits and trade that put pressure on the exchange rate contributed to chronic macroeconomic instability. The GCI placed Ghana 141<sup>st</sup> and 140<sup>th</sup>, respectively, for inflation and a government budget balance. Ghana's monetary unit, the cedi depreciated against the US dollar by 26% in 2014, the government budget deficit was approximately 11% of GDP, and inflation was 18%.

#### **2.14.1 Potential of Ghana's Manufacturing**

An African Centre for Economic Transformation (ACET) working paper on economic transformation in Ghana, recognises services and products that could drive the economic transformation of Ghana (ACET, 2012). The research employed a number of methodologies to detect the most promising services and products that could lead to Ghana engaging in foreign trade. ACET (2012) lists what should be done to recognise prospects in Ghana's manufacturing sector:

- a. Assess what foreign direct investors and export-oriented free zones firms are doing
- b. Examine export data for manufactured goods in which Ghana has a strong comparative advantage
- c. Identify high-value manufactured goods that could be produced using the skills and technologies currently used in already successful product lines.

Ghana obtained more than US\$280 million in investments in food processing from multinational companies, such as Archer-Daniels-Midland (ADM) food processing, the Cargill Corporation, the Barry Callebaut Group, Plot Enterprise (Ghana) Ltd, Niche Cocoa Industry Ltd, and Cocoa



Processing Company Ltd. Together with food processing, agro-processing has attracted more than US\$115 million in investments. Investment in Ghana's free zone companies has benefitted the manufacturing of clothes and textiles, edible oils, fish, nuts and fruits. The Ghana Free Zones Board prioritises the assembly of semi-finished manufactured goods, pharmaceuticals, fish processing, clothes and textiles food and agro-processing. The GIPC promotes investment in drugs and pharmaceuticals, clothes and textiles, and agro- and food processing.

Export data analysis reveals that Ghana has a comparative advantage in the export of a lot of manufactured goods, other than the traditional exports of crude oil, timber, gold and cocoa. Nonetheless, it would not be valuable to sink capital into manufactured goods for export from Ghana, unless they can successfully generate income and are more hi-tech than what is now being exported. However, increasing the portion of high-income, competitive products for export to global and regional markets will speed up economic transformation. Thus, investing in fish processing, agro- and food-processing, palm oil, aluminium products, wood processing and cocoa processing to increase exports from Ghana would generate an acceptable return (ACET, 2012). Nonetheless, wood processing has to deal with sustainability issues because of illegal logging and deforestation. Moreover, the manufacturing of clothes and textiles, chemicals, beverages and food, for example, requires skills, knowledge of the market and technology to add value to existing products and develop new ones.

Ghana must develop prevailing capacities to expand its product base, as indicated by the World Bank (2013), which recognised fish and food processing, construction materials, electronic components and health-related and chemical products as industries with development potential. Conducted interviews by Adarkwah et al. (2018) with stakeholders identified dynamism and prospects in the manufacture of pharmaceuticals. It was revealed that the emerging petrochemical

sector propels the chemical subsector, which included pharmaceutical manufacturing. The manufacture of pharmaceuticals is anticipated to concentrate on treating neglected tropical diseases and infections in developing countries and develop medication and remedies that tap into indigenous herbs knowledge.

To sum up, the prospects for Ghana's labour-intensive manufacturing sector are as follows (Addo, 2017; Adarkwah et al., 2018):

✓ Palm oil

The fruit of the oil palm is refined into crude palm oil. Broadly, palm oil is used in biodiesel, the chemical industry, cosmetics and detergent manufacturing and the food industry. With close to two million hectares of suitable land for the oil palm, there are prospects for considerably increasing exports of palm oil to international and regional markets.

✓ Cocoa

By adding more value to cocoa beans, cocoa could become a product for export. Currently, Ghana comes second after Cote D'Ivoire as the second-biggest producer of cocoa in the world and has developed an extensive quality control scheme, extension programme and a value chain for cocoa beans.

✓ Fish

Fish processing prepares and preserves fish and fish meals, and fish products are also manufactured. Ghana has an outstanding endowment of fisheries from the emerging aquaculture sector, lagoons, inland rivers, Bui Dam, Volta Lake and the Atlantic Ocean. The promising prospect of exporting processed and preserved fish from the aquaculture sector is massive.

✓      Pharmaceuticals

This sector has the potential to manufacture inexpensive off-patent drugs and make the most of indigenous herbs and knowledge to develop medication and remedies for key tropical diseases and infections.

✓      Aluminium products

The manufacture of aluminium materials for household products and the transport, construction and housing industry has the potential for further development. The sector is likely to be compelled by demand for household and housing products from an increasingly growing urban population. Ghana already manufactures final and intermediate goods, it could produce for export, particularly in the sub-region.

✓      Garments and textiles

Ghana should tap into the vast regional and local demand for niche African designs and fabrics and make the most of its preferential access to international markets and worldwide value chains.

✓      Agro- and food processing

To minimise post-harvest losses and add value to Ghana's horticultural products, manufacturers process and preserving them in the form of dehydrated products, concentrates, juices and food products for the international and domestic market. Prospects abound for the processing of vegetables, nuts, tropical fruit, cereals and starchy food crops (plantains, cassava, and yams).

- ✓ Component assembly

To make the most of the readily available semi-skilled labour in Ghana, manufacturers should focus on producing semi-finished manufactured goods, spare parts, tools and components for regional and local markets.

### **2.14.2 Challenges of Manufacturing in Ghana**

The Association of Ghana Industries' (AGI) quarterly Business Barometer Report, the World Bank Enterprise Survey, The World Economic Forum Global Competitiveness Report and the World Bank DBR have explained the challenges facing manufacturing in Ghana. Some of these are explained below.

#### *2.14.2.1 Competition from Imported Products*

Ghana imports large volumes of manufactured goods, which are also produced domestically. The majority of these imports are inexpensive and some are of superior quality, although inexpensive, low-quality or used products are also imported because the exporters receive subsidies from their governments in the form of export tax rebates, for example, in China. However, goods of a similar quality manufactured in Ghana might cost more because of high input costs, limited skills and economies of scale, over-staffing and old technology, for example. Therefore, manufacturers need to identify and remedy the factors that prevent their products from being competitive in the domestic market and the playing field to accelerate the growth of the manufacturing industry (Addo, 2017; Adarkwah et al., 2018).

#### *2.14.2.2 Excessive Fees, Levies and Taxes*

Manufacturers in Ghana are reliant on parts and materials imported from outside the country but are heavily taxed on these. For a typical consignment, these fees comprise Ghana Community

Network (GCNet) charge of 0.4%, a destination inspection fee of 1%, an export development and investment fee of 0.5%, an Economic Community of West African States (ECOWAS) levy of 0.5%, a processing fee of 1%, the National Health Insurance Levy (NHIL) of 2.5%, import VAT of 15% and import duties of 20, 15, 10 or 5% of the value of the consignment product. In total, these taxes and levies can range from 21% to 41% of the value of the material. Some materials attract an extra environmental levy of 20%, excise duty of 25%, a newly-launched national financial stabilisation levy of 5% and a special import fee of 1 to 2%. Moreover, payment of unauthorised fees is a common practice at the ports. USAID (2010) reported that unofficial fees paid to clear a 20-foot container from Tema Port were about US\$55.

While most processing and plant equipment incur no import duty, the NHIL and VAT can be substantial on high-value equipment. However, firms in free zones are exempted from paying taxes and duties on imported parts and materials. In addition, there is a duty recoup system whereby import duty paid on imported parts and materials is paid back when the manufacturer exports the final manufactured goods containing the parts and materials. The corporate tax rate is 25%, but GIPC-listed firms pay lower tax rates depending on the business location and sector and benefit from tax holidays of between six to ten years. Firms in free zones enjoy a ten-year tax holiday and a reduction of 8% in corporate tax. As well as corporate taxes, district and municipal structures enforce licensing levies and fees for firms sited within their area. These charges can be contentious as they are not supported by law and are enforced unilaterally and arbitrarily to raise money. The Factory Inspectorate, the Fire Service and the Environmental Protection Agency also pay a visit to the premises of manufacturing firms to carry out inspections and enforce several fees for annual certificates and a number of violations. Manufacturers are pressured by government agencies

because have tangible and visible assets that make them easy targets for revenue collectors (Nti, 2015; Adarkwah et al., 2018).

#### *2.14.2.3 Utility Pricing and the Energy Crisis*

Ghana has gone through a lengthy energy crisis, which has resulted in extensive blackouts and electricity rationing. At times, the Ghana electricity company switches off power to different parts of the country according to a timetable, which is referred to as load shedding. This phenomenon (load shedding) has intensified the challenges facing manufacturers who have always had unreliable power supply and electricity shortages. Consequently, more manufacturers have to have generators for backup power. However, some manufacturers have minimised their personnel and decreased their working hours because of load shedding. Low-capacity utilisation, increases in fuel and electricity costs, high-cost generator usage and load shedding have increased production costs for several manufacturers, which decreases the competitiveness of their manufactured goods against imported products.

In a study conducted by Adarkwah et al. (2018), key informers raised concerns about the terms and conditions of supplying power ed to consumers compared to manufacturers. The study found that current guiding principles do not acknowledge the special economic role played by manufacturers. Manufacturers offer employment and utilise huge amounts of electricity compared to residential consumers. Therefore, manufacturers expect electricity outages and load shedding to be managed better to cause minimum disruption to companies (Adarkwah et al., 2018). Moreover, service should cost less for manufacturers, as they are usually in specified industrial areas. However, electricity charges cost less. For many manufactured goods, low volume consumers pay a higher cost per unit than high volume consumers, but this scenario appears the opposite in

Ghana's electricity provision. The charge for electricity provision to the industry sector was 150% of the residential rate in Ghana in 2014, which was 75% in Kenya (Nti, 2015).

#### *2.14.2.4 Funding and Interest Rates*

Another problem encountered by manufacturers is a lack of long-term capital. A lot of manufacturers see prospects for business expansion but are not able to acquire affordable capital to make the needed investment. Manufacturers welcomed the role of the Export Development and Agricultural Investment Fund (EDAIF) in offering funds for qualified manufacturers, but they also recognised that this was insufficient and that more institutes are required to offer alternative funding sources.

Manufacturers have noticed that the EDAIF might be over-extended, which could result in lobbying and political pressure. However, EDAIF is capable of carrying out its role because it has a source of consistent and predictable funding and does not rely on consolidated funds or government subvention. The high-interest rate on loans is another capital-related issue. The interest rate on loans accessed from commercial, financial institutions ranges from 30 to 40%, and the interest rate of microfinance firms ranges from 60 to 80% (Addo, 2017).

#### *2.14.2.5 Lack of Government Commitment*

Another difficulty faced by manufacturing firms is a lack of commitment by the government to manufacturing. The problems of the manufacturing industry have been talked about in several forums, but the government has only paid lip service and has done nothing about them. Adarkwah et al. (2018) report that the AGI made several presentations on manufacturers' behalf, but very little has come out of their endeavour. Some manufacturers have pondered how the planned Ghana Transformation Forum would be different from other talk shops. Some manufacturers are of the view that government does not seem to understand or appreciate the tactical role played by

manufacturers in the development of the nation as a creator of employment, a source of technological capacity and a key source of tax revenue.

Manufacturers in Ghana have criticised the government for not utilising its buying power to assist them, referring to the recent disclosure that the redesigned Parliament House of Ghana was equipped with furniture imported from China (Adarkwah et al., 2018). In addition, manufacturers believe that some government policies destabilise the growth of the Ghanaian manufacturing industry. For instance, permitting the free import of used clothes has ruined the textile industry, and the used spare parts of vehicles imported into the country have decreased the incentives for local manufacturers to produce vehicle parts (Addo, 2017; Adarkwah et al., 2018)

## **2.15 Chapter Conclusion**

In conclusion, the literature review has explored various aspects of supply chain management (SCM) and how it has evolved over time. It highlighted the importance of SCM functions in enhancing supply chain performance, reducing risks, and increasing flexibility, agility, and responsiveness. Furthermore, the review discussed the role of technology in SCM, including its impact on supply chain transparency, which is a critical aspect of sustainable supply chain management (SSCM). The literature review also discussed the concept of sustainability and how it has become increasingly important for businesses to adopt sustainable practices, including SSCM. The Fourth Industrial Revolution has presented new opportunities for businesses to integrate sustainability into their operations and enhance their performance. Additionally, the review explored the manufacturing sector in Ghana, which faces challenges in adopting sustainable practices due to various constraints.

The conceptual framework for SSCM provided a useful guide for understanding the key drivers of sustainable practices in supply chains, including sustainable product and process design, supply-



side and demand-side sustainability collaboration, instrumental, relational, moral, and knowledge factors. Finally, the empirical review highlighted the importance of organizational culture and resources in driving SSCM adoption. Overall, the literature review has provided a comprehensive overview of the key concepts, drivers, and challenges of sustainable supply chain management. It has highlighted the need for businesses to adopt sustainable practices to remain competitive in today's market and the potential benefits of doing so, including improved supply chain performance, risk reduction, and enhanced social and environmental sustainability.

## **CHAPTER 3**

### **THEORETICAL LITERATURE REVIEW**

#### **3.1 Introduction**

This chapter discusses theories explaining why manufactured firms engage in SSCM, although several authors have remarked that a theoretical framework for SSCM is usually absent in research (Svensson, 2007; Seuring & Muller, 2008, Carter & Rogers, 2008). Moreover, attempts to propose theoretical contexts for SSCM are still ongoing (Gold et al., 2010; Morali & Searcy, 2013). According to Font et al. (2008), SSCM draws from theories on companies ensuring that their supply chain downstream towards consumers and upstream towards producers promotes sustainability in the production process and final products or services. The current study was guided by six theories: the contingency theory, the resource-based view (RBV) the relational-view theory (RVT), the innovation diffusion theory, the stakeholder theory and the resource dependence theory (RDT). These theories are discussed below.

Sustainable Supply Chain Management (SSCM) has become an essential concept in recent years. SSCM is a challenging topic to research as it involves various stakeholders and multi-dimensional issues. Scholars have used various theories to understand and explain the SSCM phenomenon. Theories such as the Resource-Based View (RBV), Contingency Theory (CT), Institutional Theory (IT), Stakeholder Theory (ST), and Diffusion of Innovation Theory (DOI) have been used in SSCM research. These theories have been applied in various contexts to investigate the impact of SSCM on firms and the environment. Researchers have also combined theories to provide more comprehensive explanations of SSCM.

RBV is a common SSCM theory. The notion indicates that a firm's unique resources and competencies might provide it with a competitive edge. SSCM researchers have used RBV to study environmental and financial performance. Berrone et al. (2013) examined environmental

investments and corporate performance using RBV. Environmental investments improved business performance, validating RBV theory. SSCM research also widely uses Contingency Theory (CT). The approach advocates aligning organisational structures and strategies with environmental conditions for best performance. SSCM researchers have used CT to study environmental practises and corporate performance. Jabbour et al. (2014) examined how environmental practises affect Brazilian enterprises' operational performance using CT. Environmental initiatives improved operational performance, validating CT theory.

SSCM research has employed institutional theory. The hypothesis claims that societal norms and rules impact companies' behaviour. Institutional theory has been used to study SSCM adoption factors. Seuring and Muller (2008) examined German enterprises' SSCM adoption challenges using institutional theory. Institutional pressures, including client expectations and laws, drive SSCM implementation, according to the report. The summary table of additional theories that have been used in SSCM research:

**Table 3.1: Summary of how theory has been used in SSCM research**

<b>Theory</b>	<b>Description</b>	<b>Example citation</b>
Institutional theory	Focuses on the influence of social norms, values, and beliefs on organizational behaviour	Glover et al., 2014; Shubin et al., 2020; Kauppi, 2013; Yawar & Kauppi, 2018; Gupta et al., 2020; Hartley, Sawaya & Dobrzykowski, 2022
Diffusion of innovation	Focuses on the process by which new ideas are spread through a social system	Hartley, Sawaya & Dobrzykowski, 2022; Zhu, Sarkis & Lai, 2012; So, Parker & Xu, 2012; Amini & Jahanbakhsh Javid, (2023)

<b>Theory</b>	<b>Description</b>	<b>Example citation</b>
Contingency theory	Focuses on the fit between organizational practices and the external environment	Wu et al., 2014; Wamba & Chatfield, 2009; Fernández-Robin et al., 2019; Morais & Barbieri, 2022; Shymko & Diaz, 2012; Walker & Jones, 2012.
Stakeholder theory	Focuses on the interests and relationships among a firm's stakeholders	Morais & Barbieri, 2022; Kayikci et al., 2022; Lavassani & Movahedi, 2010; Hörisch, Freeman & Schaltegger, 2014; Shah & Bookbinder, 2022; Chacón Vargas & Moreno Mantilla, 2014
Resource dependence	Focuses on the relationships between firms and their external environment	Shibin et al., 2020; Denktas-Sakar & Karatas-Cetin, 2012; Chand & Tarei, 2021; Schnitfeld & Busch, 2016; Xiao et al., 2019
Complexity theory	Focuses on the interactions and feedback loops between actors in a system	Najjar & Yasin, 2021; Chand et al., 2022; Abbasi, 2014; Silvestre, 2015.
Legitimacy theory	Focuses on the need for organizations to align with societal norms and values	Crossley, Elmagrhi & Ntim, 2021; Czinkota, Kaufmann & Basile, 2014; Rezaee, 2018; Mani & Gunasekaran, 2018.
Social Network theory	Focuses on the relationships and interactions between actors in a network	Mari, Lee & Memon, 2015; Lu et al., 2018; Hiranphaet et al., 2020;

<b>Theory</b>	<b>Description</b>	<b>Example citation</b>
Resource-based view	Focuses on the internal resources and capabilities of a firm	Chacón Vargas & Moreno Mantilla, 2014; Chand & Tarei, 2021; Shibin et al., 2020; Arda et al., 2023; Sharma et al., 2022.
Relational view theory	Focuses on the importance of inter-organizational relationships for firm performance	Viana & Sousa-Filho, 2017; Somsuk, Pongpanich & Teekasap, 2013; Chin, Tat & Sulaiman, 2015.
Supply chain integration	Focuses on the integration and coordination of activities across a supply chain	Carter & Rogers, 2008; Kannan & Tan, 2005; Gligor & Holcomb, 2012; Huo et al., 2015; Zhou et al., 2020.

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*Source: Author's construct (2022)*

### **3.2 Stakeholder Theory**

According to stakeholder theory, when making business decisions, firms should consider not just the interests of their shareholders but also those of their stakeholders. According to Freeman (1984), stakeholders are individuals or organisations who can influence an organisation's actions or are affected by those actions. Employees, customers, suppliers, government agencies, and communities are examples of stakeholders. Businesses that are aware of a stakeholder perspective can evaluate the broader effects of their decisions and activities and try to create value for all stakeholders.

The possible conflict between stakeholder interests is a fundamental issue linked with stakeholder theory. In a number of instances, the interests of many stakeholders may conflict, posing difficulty for businesses attempting to resolve these disparities. For example, providers may strive to maximise profits by increasing prices, whereas buyers may demand lower pricing. In such

circumstances, businesses must make trade-offs between stakeholders' interests and seek a balance that provides value for everyone.

Yang (2018) maintains that researchers use stakeholder theory to explain a firm's motivation for ensuring sustainability, especially internationally, due to coercive, mimetic and normative pressure from direct and indirect stakeholders (Vejvar et al., 2018; Lai et al., 2013). In the context of sustainable supply chain management (SSCM), stakeholder theory emphasises the significance of incorporating the interests of diverse stakeholders into the design and implementation of sustainable supply chain practises. For instance, a company may deal with suppliers promoting environmental sustainability, even if it means paying more for their products. This choice improves the environment and satisfies the sustainability-focused expectations of customers and other stakeholders. Moreover, corporations can engage in stakeholder conversation to identify and address the problems and interests of diverse stakeholders, which can result in enhanced relationships and long-term advantages.

In addition, Stakeholder theory has been associated with SSCM practises as companies aim to manage the environmental and social implications of their activities on a variety of stakeholders (Meixell & Luoma, 2015; Chacón Vargas & Moreno Mantilla, 2014). By adopting SSCM methods, businesses can reduce their negative impact on the environment and society while simultaneously producing value for stakeholders such as consumers, employees, and communities. Firms can use green supply chain methods, for instance, to lessen the environmental impact of their operations while also satisfying customer demand for sustainable products.

Through collaboration and engagement, businesses can reconcile the divergent interests of stakeholders (Ratten et al., 2019; Freeman, Dmytriiev & Phillips, 2021). By collaborating with stakeholders to comprehend their challenges and objectives, businesses can uncover areas of

common value and work towards solutions that are mutually beneficial. For instance, a company may collaborate with its suppliers to decrease waste and emissions, so reducing costs, improving the environmental impact of its operations, and creating value for its suppliers (Habib, Bao & Ilmudeen, 2020).

Transparency and accountability are another way corporations might balance stakeholders' divergent interests (Fung, 2014; Andriof & Waddock, 2017). Firms may develop a shared knowledge of their difficulties and possibilities by being honest about their operations and impact and being accountable for their actions. For instance, a company may report to investors and other stakeholders on its sustainability performance, which can increase transparency and foster confidence.

In general, stakeholder theory provides businesses with a valuable framework for considering the interests of diverse stakeholders when making SSCM-related choices. Firms can produce value for all parties by adopting collaborative, transparent, and responsible strategies, despite the difficulties associated with resolving stakeholders' conflicting interests. In the framework of SSCM, stakeholder theory can assist organisations in identifying areas of shared value and pursuing sustainable solutions that are beneficial to all stakeholders.

### **3.3 The Resource-Based View**

Wernerfelt (1984) and Barney (1991) contend that to gain and maintain a competitive edge, companies must have imperfect, rare, valuable and non-substitutable resources. Bowen et al. (2001) draw on the RBV, which is derived from the strategic management literature, to connect company resources with triple bottom-line performance in SSCM. Based on Bowen et al.'s (2001) finding, Gold et al. (2010) prove that SSCM is a catalyst for an inter-organisational competitive

advantage through the inter-organisational use of resources inter-organisation competitive advantage.

According to Jensen et al. (2016), the RBV is a framework for determining the intangible and tangible strategic resources that a firm can exploit to gain and sustain a competitive edge. Tangible resources are physical assets, such as buildings, equipment, cash and investment, whereas intangible resources include human resources, knowledge, customer goodwill and the organisational culture. In the context of SSCM, eco-friendly physical resources include green buildings and trucks, vessels and equipment, which have social benefits, such as enhancing employee health and safety), environmental benefits, such as reducing the pollution index, and economic benefits, such as green energy becoming cheaper every year (Schinas et al., 2018).

Investment in new tangible physical resources, such as up-to-date technology and facilities, and the upgrading of intangible resources, such as employee wage increases, demand financial resources (Busby, 2019). For example, Progolaki and Roe (2011) mention that a lack of financial resources prevents a firm from ensuring environmental sustainability and enhancing the working environment and that of the local and global community. According to Yuen et al. (2019b), knowledge is a dynamic resource that ensures effective operational strategies for maintaining a firm's competitiveness. Sunderland and Denny (2016) emphasise the significance of organisational culture as a set of beliefs and values determining the management of a firm and the behaviour of its employees, which in the case of SSCM would ensure that members of the SC are committed to environmental, social and economic sustainability.

### **3.4 Relational View Theory**

Dyer et al. (2018) observe that while the RBV sheds lights on the significance of resources in promoting sustainability, the relational view theory (RVT) highlights the need to consider



networks of firms in ensuring the SC promotes sustainability practices, which competitors might not be able to do. These resources can be grouped into effective governance mechanisms, complementary resources and capabilities, inter-firm knowledge sharing and inter-firm relationship management. Herremans et al. (2016) emphasise inter-firm relationship management for enforcing safety measures in a manufacturing firm and associated businesses.

According to Child et al. (2019), inter-firm relationship management improves a firm's competitive edge and SSCM by forming complex, inter-firm bonds, encouraging the engagement of associates and building their trust in a manufacturing firm's devotion to sustainability goals. The trust of a firm's associates can decrease the cost of managing, negotiating, and imposing sustainability-related requirements and objectives.

Dyer et al. (2018), Cross et al. (2001), Muzammal et al. (2020) and Chandio et al. (2014) explain that the RVT highlights the need for and advantages of inter-firm knowledge sharing through reports and databases, for example, to instil sustainability practices throughout the organisation and its associates. According to Lee and Nam (2017), the benefits of sustainability information sharing include improving service quality and well as money and time savings. Thus, SSCM "can be enhanced by sharing sustainability information through inter-firm workshops, meetings and conferences to exchange the best ideas and practices. In" addition, the sharing and pooling of labour, equipment and fiscal resources, for example, to deal with sustainability would ensure SSCM and the competitive advantage through inter-firm resources.

Duschek (2004) explains that inter-firm contractual arrangements, ranging from loose alliances, such as arms-length transactions, to tighter forms, such as joint ventures, partnerships, mergers and acquisitions, would sustain competitiveness. Roh et al. (2016) mention that contractual arrangements would outline the duties of the partnering firms and specify the sharing of incentives,

rewards and risks. Moreover, contractual arrangements would formalise the inter-firm information exchange of fiscal data, services and sustainability objectives (Zhang & Wang, 2018), which would lead to the formulation and adherence to mutual sustainability policies.

### **3.5 Innovation Diffusion Theory**

The innovation diffusion theory (IDT) has been applied in the fields of SCM, communication, education, marketing, information technology, sociology, and agriculture, for example (Rogers, 1995; Agarwal et al., 2005; Lau & Woods, 2008). The term “innovation” refers to a practice, notion, or object that is observed as new by a person or another entity that adopts it (Chang & Tung, 2008; Rogers, 1995). The term “diffusion” is the dissemination of something, which in the context of innovation could mean a new practice, idea or object is spread via a network over time amongst members of a social system (Chang and Tung, 2008; Rogers, 1995). Hence, in the context of SSCM, the IDT would indicate firm acceptance and adoption of new sustainable technologies, such as mobile tool-enabled services, collaborative planning forecasting and replenishment, radio frequency identification, alternative energy resources and new vessel designs (Lodro et al., 2018; Magsi et al., 2018; Wang et al., 2018; Agarwal et al., 2000; Yuen et al., 2018a; Wang et al., 2018), which are essential to SSCM, as they build a green image, attract more customers, and improve the efficiency of firms. “Nonetheless, for these technologies to be used, they have to be accepted and adopted by employees who play a crucial role in the decision-making and procurement of technologies that improve sustainability (Sodhro et al., 2019; Lin et al., 2019). Employees would accept and adopt new technology based on its compatibility, relative advantage, observability, complexity reduction and trialability and relative advantage (Rogers, 2010; Yuen et al., 2018b).” Rogers (2010) maintains that compatibility is the level of an innovation’s reliability as perceived by prospective users based on their needs, past experiences, and existing values. Vagnani and

Volpe (2017) note that a greater “level of compatibility increases the anticipated net benefits of technology for the reason that lesser effort by firms is needed to incorporate the new technology with those already deployed.”

The relative advantage of new technology is the “level to which an innovation is regarded as being superior to what it substituted (Yuen et al., 2018a). Employees or manufacturing firms will go for technologies that offer clear benefits compared to their existing technology. These benefits can” be social, such as job satisfaction, better user experiences, social prestige and the enhancement of the worker and the firm’s image, and economic, such as lower maintenance costs and higher profitability compared with the current technology).

A manufacturing firm will be more ready to adopt new technology when it realises that it is superior to its existing technology and not as complex as employees might think. Rogers (2010) defines complexity as the users’ perception of the new technology as difficult, which indicates that new skills need to be developed to reveal its easy usage (Wang et al., 2018).

Vagnani and Volpe (2017) point out that observability is the degree to which the results of innovations can be observed. Observing others using new technology and understanding the procedures and outcomes leads not only to vicarious learning, which is learning from the experiences of others, but also acceptance and adoption. Moreover, Hashem and Tann (2007) maintain that the communication of the benefits of new technology to workers enhances technology acceptance.

Trialability is the degree to which innovations can be tested (Alateyah et al., 2012; Rogers, 2003). Conducting trials with, for example, new sustainability technology enables firms to explore and experiment with its impact and potential to enhance sustainability. In addition, trials identify and

resolve problems with the new technology and help users familiarise themselves with it before it is fully adopted (Wang et al., 2018).

### **3.6 Contingency (fit) Theory**

Contingency theory claims that managing a firm (including SSCM) is contingent (dependent) on many external and internal factors, such as the suitability of the environment in which a firm and its subsystems function (Lawrence & Lorsch, 1967; Fiedler, 1971, Donaldson, 2001; Yuen et al., 2019b). According to Donaldson (2001), this theory suggests that a firm's environment affects performance, which, in turn, drives adaptive organisational change. The current study perceived contingency as a firm's suitability or fitness for successful SSCM. If a manufacturing firm is not fit for SSCM, organisational sustainability performance will be inadequate. (Yuen et al., 2019a).

The literature proposes two main contingencies to promote SSCM: competitive strategies and strategic intention. However, in SSCM, these contingencies should be altruistic and not only for profit because a firm invests in environmental and social sustainability in addition to having commercial expectations according to the TBL approach (Yuen and Thai, 2017). The economic benefits would be reputation/image (Yuen et al., 2017b) and stakeholder satisfaction, market share and investment return (Yuen et al., 2016a).

Manufacturing firms may adopt competitive strategies, such as differentiation and cost leadership strategies. Typically, manufacturing firms that adopt a differentiation strategy seek a competitive edge by providing a product or service that is distinct from their rivals (Liu & Atuahene-Gima, 2018). Some firms may employ SSCM practices in order to improve their reputational distinction and promote environmental sustainability. For instance, a manufacturer of eco-friendly products may strive to distinguish themselves from competitors by implementing SSCM methods that promote sustainability and lessen their environmental imprint. This can assist the company in

appealing to environmentally sensitive clients and enhancing its reputation as a socially responsible enterprise.

In contrast, manufacturing companies that follow a cost leadership strategy concentrate on lowering their production costs to gain a competitive edge (Yuen et al., 2017a; Lam & Wong, 2018). Some organisations may employ SSCM strategies that cut costs and improve operational efficacy. Likewise, organisations with a cost leadership strategy may use SSCM methods to save expenses, including energy and resource efficiency measures, waste reduction and recycling programmes. This can reduce costs and enhance financial performance (Lam & Wong, 2018). For instance, a manufacturer may implement waste reduction, energy efficiency, and green supply chain management to lower manufacturing costs and boost their bottom line.

The adoption of SSCM methods may also rely on a company's size, age, and market concentration. For instance, larger companies may have greater resources to engage in SSCM procedures, but younger companies may be more prepared to take chances and experiment with new methods. In addition, enterprises operating in international markets may be more prone to implement SSCM techniques due to greater pressure from international norms and standards and the need to maintain a favourable image and reputation in foreign markets (Zhu et al., 2020).

Yet, the implementation of SSCM principles may also provide obstacles for businesses, particularly those with limited budgets and resources. Smaller organisations may have difficulty implementing SSCM techniques owing to a lack of resources or knowledge, whereas larger firms may encounter resistance from employees or stakeholders who are opposed to change or do not understand the value of such activities.

Despite the potential advantages of SSCM methods, their adoption is not always simple. A lack of resources, awareness or knowledge of SSCM techniques, and a perception of a lack of benefits

may impede adoption by manufacturing organisations (Liu & Atuahene-Gima, 2018). In addition, the implementation of SSCM techniques may necessitate modifications to the company's culture, processes, and supply chain, which can be tough.

The adoption of SSCM methods by manufacturing organisations can be influenced by a variety of factors, including the firm's competitive strategy, size, age, and market concentration. By using SSCM principles, businesses can improve their environmental and social sustainability, as well as their competitive edge and bottom line. However, adopting SSCM techniques may also include overcoming several obstacles and difficulties, and organisations may need to weigh the possible costs and advantages before deciding to embrace these practices.

### **3.7 Resource Dependence Theory**

Davis and Cobb's (2010) RDT holds that external resources affect organisational behaviour and that firms must engage with other businesses in their environment to obtain resources. Thus, the RDT provides a framework for understanding the relationship between a company and the environment (Esfahbodi et al., 2016; Drees & Heugens, 2013). The RDT proposes "that firms are not self-sufficient and depend on the environment and its resources for survival and the accomplishment of long-term objectives (Kisaka & Anthony, 2014; Brettel & Voss, 2013). Furthermore, firms find important resources by looking outside their boundaries (Nuruzzaman, 2015; Malatesta & Smith, 2014)."

Interdependence on required resources produces interorganisational power that drives "organisational behaviour and supplier-buyer relations (Gaffney et al., 2013). Businesses with a power advantage gain a dominant position in the network, which leads to a competitive advantage (Nuruzzaman, 2015; Green et al., 2015). In addition, the ability to affect the activities of other members of the network determines the extent of the partnership between suppliers and buyers in

networks (Tachizawa & Yew Wong, 2014; Kahkonen, 2014), and businesses use different” approaches to obtain the resources required for different coordination levels (Malatesta & Smith, 2014).

The RDT proposes that a business is in charge of the internal power distribution within its SC and the inter-firm external power distribution (Parastuty et al., 2015; Brettel and Voss, 2013). However, the problems encountered by a business and a lack of self-sufficiency generate resource dependence, uncertainty and control by external powers (Vecchiato, 2015; Parastuty et al., 2015; Brettel and Voss, 2013).

Tachizawa and Yew Wong (2014) mention that power relations “are intrinsic to global supply networks. Innovation and competition are no longer just between single businesses, but between SC networks, and this interdependence makes inter-organisational relationships problematic (Malatesta & Smith, 2014). Dependence on suppliers for crucial resources directly influences socially and environmentally responsible practices (Tachizawa & Yew Wong, 2014; Hoejmose et al., 2013).” Businesses constantly pay for resources, such as distribution channels, material resources, technologies, procedures and standards, and are thus dependent on the external environment, although businesses in the network might have different objectives and strategies (Pfeffer & Salancik, 1978; Malatesta & Smith, 2014). A few strong

Malatesta and Smith (2014) emphasise that the RDT is used by managers to guide organisations “in short-term survival and long-term growth and is included in studies on contemporary organisations and, particularly, in research on SC relationships (Tachizawa & Yew Wong, 2014). Wry et al. (2013) claim that the unique insights of the RDT on the complexity of an organisation’s external environment” provide solutions to the problem of a firm's contemporary relevance. Furthermore, researchers have used the RDT in the field of SCM, such as Paulraj and Chen (2007),

who designed an SCM strategy “based on environmental uncertainty and concluded that the relationship between SCM strategy and environmental uncertainty supports the RDT.”

Wolf “(2014) applied the RDT to an SSCM context, thereby extending the range of theories currently applied in the area. Esfahbodi et al. (2016) employed the RDT to investigate the relationship between SSCM practices and organisational performance. Ramanathan et al., (2014) carried out a holistic analysis taking into consideration a variety of stakeholder pressures in a single framework and extended the use of the RDT.”

Those who disagree with the RDT contend that although it is difficult to disagree with the theory, it has not been extensively tested and needs extension and improvement (Malatesta & Smith, 2014). Examining inter-organisational relationships in explaining the RDT is not enough, whereas integrating the theory with other theoretical frameworks, such as the real options theory, stakeholder theory and the RBV, might provide more insights into the relationship relation between an organisation and its environment (Hillman et al., 2009).

Hillman et al. (2009) mention that the incorporation of the RBV into the RDT would improve understanding of organisational resources, and incorporating the RDT into the stakeholder theory might lead to insights into managing dependencies (Hillman et al., 2009). Therefore, comparing and incorporating the RDT into competing or complementary theories might result in a better comprehension of environmental uncertainty, interdependence, the drivers of sustainability initiatives and how businesses can benefit from the external and internal factors influencing SSCM (Varsei et al., 2014).

### **3.8 Linking the theories to SSCM Practices**

The use of multiple theories in the study on sustainable supply chain management practices (SSCM) among selected manufacturing firms in Ghana was done to give a comprehensive



understanding of the phenomena under consideration. These theories were selected because they have been widely utilised in prior SSCM research and have been beneficial in explaining various elements of the association between SSCM practices and firm performance. A number of studies also used multiple theories in their SSCM research. For example, Morali and Searcy (2013) used five theories: contingency theory, institutional theory, RBV, RDT, and stakeholder theory in their study; Chand and Tarei (2021) used two theories: resource-based theory and resource-dependence theory; Nag Sharma and Govindan (2021) used three theories: resource-based view, resource-dependence theory, and stakeholder theory.

Using these six theories, the study was able to give a more nuanced and comprehensive understanding of the factors that impact the adoption and implementation of SSCM practises among Ghanaian manufacturing enterprises. Moreover, it contributes to the body of knowledge by applying these ideas to a new environment, namely the Ghanaian manufacturing sector. This study gives insight into the application of these ideas in emerging economies, where the acceptance and implementation of SSCM methods may be more difficult due to limited resources and other contextual variables. The application of these ideas to the study increases the rigour and validity of the findings and lays the groundwork for future research in the field of SSCM.

The six theories utilised in the study are pertinent to its research aims. Using the contingency theory, we examined how adopting SSCM methods differs depending on the various organisational contexts in which manufacturing businesses operate. Using the resource-based view, the role of resources in the implementation of SSCM techniques was analysed. The relational view theory was employed to examine how the relationships between manufacturing firms and their stakeholders influence the adoption of SSCM practices. The innovation diffusion theory was

utilised to determine how communication, social structure, and time impact the development of SSCM techniques among manufacturing organisations.

Using stakeholder theory, the role of stakeholders in the implementation of SSCM techniques was evaluated. The research examined the influence of stakeholders such as consumers, suppliers, workers, and the community on the adoption of SSCM practices. The resource dependency theory was then applied to evaluate the manufacturing enterprises' reliance on external resources such as suppliers, regulators, and consumers for the implementation of SSCM methods. The idea highlights the significance of recognising the interconnectedness between companies and their operating environment.

In summary, the six theories utilised in the study give a comprehensive framework for comprehending the SSCM practises of Ghanaian manufacturing firms. The theories aid in determining how the adoption of SSCM practises differs dependent on organisational context, the role of resources, the linkages between manufacturing enterprises and their stakeholders, the diffusion of SSCM practises, the role of stakeholders, and the dependency on external resources. The results of this study contribute to the existing body of information on SSCM practises by shedding light on the factors that impact the adoption of SSCM practises among Ghanaian manufacturing enterprises.

### **3.9 Advantages and Disadvantages of Multiple Theories**

In order to comprehend complicated phenomena like sustainable supply chain management, researchers may find it useful to use a multi-theory approach (Saeed et al., 2018; Goertz, 2016). To develop a cohesive framework for the research, it is necessary to carefully evaluate and assess the advantages and disadvantages of each theory as well as how they relate to one another.

Research methods that employ multiple theories can have both advantages and disadvantages. The following are the advantages of a multi-theory approach in research:

- **Comprehensive understanding:** The use of multiple theories enables a more thorough comprehension of the phenomenon being studied (Bryman, 2012; Bamberger & Pratt, 2010). This method can give a clearer understanding of the variables that affect the phenomenon and how they relate to one another.
- **A multi-theory method also assists researchers in addressing the shortcomings and limits of current theories** (McIvor & Bals, 2021; Galloway, 2022; Brewer & Hunter, 2006). Several theories can be used to produce a more complete and complex explanation of the event under study. For instance, incorporating theories from various disciplines, such as resource dependence theory, stakeholder theory, and innovation diffusion theory, can give researchers studying sustainable supply chain management a more thorough understanding of the complex dynamics involved in putting sustainable supply chain practises into practice.
- **Improved validity:** The validity of a study can be improved by using several hypotheses to explore a phenomenon (Gioia et al., 2013; Hesse-Biber & Johnson, 2015). It enables the researcher to combine information from various sources and viewpoints, which can help ensure that the conclusions are reliable and correct.
- **Diverse viewpoints:** Each theory contributes a distinct viewpoint to the research, and using multiple theories can help overcome the drawbacks of one theoretical perspective (Sternberg, 2018). This method enables a variety of viewpoints, which can enhance the research outcomes.

- New insights: The application of multiple theories might result in innovative insights that might not have been achievable with a single theory (Bryman, 2012; Goertz, 2016). It enables the researcher to bring together many concepts and ideas from other theories, which may result in fresh and original conclusions.

The following are the drawbacks of a multi-theory approach in research:

- Complexity: Using multiple theories can make the research difficult to conduct and more complicated (Marchionni & Oinas, 2023; Ahram, 2013; Hesse-Biber & Johnson, 2015). Different theories can be challenging to integrate and reconcile, which could cause ambiguity and confusion in the research findings.
- Time-consuming: Using numerous theories might take a lot of time because the researcher must fully comprehend each theory and how it applies to the investigation (Hesse-Biber & Johnson, 2015). The amount of time and money needed to carry out the research may increase as a result.
- The danger of oversimplification: The employment of different hypotheses may cause the results of the research to be oversimplified (Marchionni & Oinas, 2023). The researcher may make an effort to harmonise various hypotheses, resulting in a streamlined explanation that does not accurately reflect the complexity of the event under study.
- Generalization challenges: The employment of numerous theories can make it challenging to apply the results to different circumstances (Rau, 2020). The generalizability of the research findings may be constrained by the theories' context-specificity and potential lack of applicability in other contexts.

### **3.10 Chapter Summary**

In conclusion, using several theories in research offers both benefits and drawbacks. While it may result in a more thorough understanding of the topic being studied, it can also be complicated, time-consuming, and may cause the research findings to be oversimplified. Six theories guided the current study to give a complete framework for understanding Ghanaian manufacturing businesses' SSCM practises. The theories provide insight into how SSCM adoption varies depending on organisational context, the role of resources, the connections between manufacturing companies and their stakeholders, the dissemination of SSCM practices, the role of stakeholders, and the reliance on outside resources.

## **CHAPTER 4**

### **RESEARCH METHODOLOGY**

#### **4.1 Introduction**

This “chapter presents the research methodology followed in the study to achieve the research objectives and answer the research questions. Therefore, the chapter explains the following: the research design; the research paradigms; quantitative and qualitative research; the study site; the target population; the sample size and sampling technique; the data collection method; data quality control; data analysis methods; ethical considerations; and the study” limitations.

Silverman (2003) maintains that a research methodology is neither right nor wrong, only more or less useful in solving the research problem, achieving the research objectives and answering the research questions. A research methodology is the explicit strategies and procedures based on scientific principles and a research paradigm, which are followed according to a research design in the quest for knowledge about a particular topic (Bryman & Bell, 2015; Lu, 2017; Eldabi et al., 2002).

#### **4.2 Research design**

A “research design is a framework or structure that directs and guides the research methodology, including the methods used for data collection and analysis, for example (Creswell & Creswell, 2017). Creswell and Creswell (2017) maintain that a research design enables researchers to connect empirical data to its research objectives and the study’s conclusion in a coherent order. This involves the determination of a research problem, examining the problem by gathering data, analysing the data and then making conclusions and recommendations based on the results of the” data analysis.

The current study followed an explanatory research design. Explanatory research, as explained by Saunders *et al.* (2007) quoted in Lelissa (2018), is conducted when there is not enough knowledge of a phenomenon and a problem that has not been clearly defined. Even though explanatory research does not intend to provide conclusive and final answers to the research questions, but merely explores the research topic with varying levels of depth. Hence, its theme is to tackle new problems on which little or no prior study has been done (Brown, 2006). Explanatory research, even in the extreme case, forms the basis for more conclusive research and determines the initial research design, data collection method and sampling methodology (Singh, 2007).

On the other front, explanatory research explains and accounts for descriptive information. Therefore, while descriptive studies may ask ‘what’ kinds of questions, explanatory studies seek to ask ‘how’ and ‘why’ questions (Grey, 2014). It builds on descriptive and exploratory research and determines the actual reasons a phenomenon occurs. Explanatory research looks for causes and reasons and provides evidence to support or refute a prediction or explanation. It is conducted to discover and report some relationships among different aspects of the phenomenon under study. As defined in the previous section, the study's main objective is to explore the SSCM practices in manufacturing firms in Ghana. To achieve this, it draws statistical and quantitative results and further seeks to provide justifications for the established relationship with a qualitative study. Thus, the relevant research design obviously is an explanatory type that responds to both the why and how a facet of the fundamental research question.

The current study followed a descriptive research design. The purpose of a descriptive design is to determine, describe and explain the characteristics of the variables linked to a sample of a target population, which calls the researcher to collect and interpret data. A descriptive design seeks to answer questions about the phenomenon under study, such as what, how, where and when

(Blumberg et al., 2008). This research design was chosen because it would be more effective in studying SSCM in manufacturing firms in Ghana.

A descriptive research design has some weaknesses that have been pointed out by various researchers (Blumberg et al., 2008; Bryman, 2008; Sumeracki, 2018). Cause and effect relationships cannot be determined through a descriptive research design. Moreover, care must be taken when using the data collection methods indicated by a descriptive research design because, at times, individuals (or even animals) change their conduct/attitude if they are aware that they are being watched. In addition, when following a descriptive research design, the research should ensure that respondents give honest answers instead of socially acceptable responses to the questions (Sumeracki, 2018). For instance, if a company manager is asked whether the firm considers the reduction of environmental pollution in your operation, the obvious answer would be “yes”, which might not be true.

Despite these weaknesses, a descriptive research design was appropriate because it is used a lot in social sciences. Furthermore, a descriptive research design indicates the use of research methods that gather detailed data, particularly in qualitative research. In addition, a descriptive research design can lead to hypotheses on cause-and-effect relationships, although it would have to be combined with another type of research design (Sumeracki, 2018). However, a descriptive research design allows for data analysis methods that establish links between variables, such as the effect of various variables on the SSCM practices of the firms under study and the relationship between SSCM and manufacturing firms' performance in Ghana.

Several individual designs fall under descriptive research (Bryman, 2008):



## ✓ Survey research

A “survey research design allows a numeric (quantitative) or qualitative description of attitudes, opinions or trends of the target population by studying a sample of it. A survey research design would entail using both structured and unstructured questionnaires for collecting an extensive range of data, with the intent of generalising from a sample to a population (Babbie, 2007) and the identification of attributes of a large population from a small sample. Nonetheless, one weakness of the survey research design is that respondents may not always be comfortable with providing responses that depict them in an unfavourable way (University of Southern California, 2016). In the current study, the survey research design involved the selection of a workable sample size.”

## Case study

A “case study research design is based on solving a particular research problem and does not entail a comprehensive, comparative or sweeping statistical survey. It is normally employed to confine a very wide field of study to one or a small number of easily researchable examples. Yin (2003) maintains that a case study research design is the ideal choice when the researcher has little control over proceedings and when the emphasis is on a contemporary phenomenon from a real-life perspective.”

A case study of a specific place is based on the principles of qualitative research, and generalisation is “limited to the environment of the research in contrast to quantitative research whereby the use of a case study results in a careful selection of a sample that is representative enough to be generalised beyond the circumstance in which the research is being carried out. In the current study, a qualitative case-study research design was used to” describe the SSCM activities of the

manufacturing firms included in this study because it enabled respondents to express their views in detail on areas that would not be possible using a quantitative research design (Lin, 2017).

### **4.3 Research paradigms**

The philosophical suppositions that underpin a research design are determined by the research objectives and, in turn, determine whether qualitative or quantitative research methods would be appropriate (Bell, 2014; Creswell and Creswell, 2017). The current study was carried out in the context of both the positivist (deductive) and interpretivist (inductive) paradigms.

#### **4.3.1 Positivism**

Positivism contends that verifiable information/data can be obtained through sensory experiences and interpreted using mathematical and rational methods (Saunders et al., 2009). Bryman (2001) maintains that in positivism, the social domain is viewed in the same way as the natural world, signifying that social science involves the scientific method to investigate facts and experiences (Chalmers, 1999).

Carter and Ellram (2003) maintain that positivism has been dominant in the SSCM literature on the facts and experiences of manufacturing firms. Bryman and Bell (2015) point out that positivism emphasises that realism is “out there” and the investigator should be interested in discovering the most effective and objective means to collect factual data on reality.

Saunders et al. (2009) mention that positivism is typically characterised by quantitative methods and based on the measurement of facts. In addition, Chicksand et al. (2012) note that SSCM research comprises knowledge development, generalised theory and a scientific background. This is in line with the positivism paradigm, which is usually about research hypotheses and research models tested with empirical data (Bryman, 2001). The positivist research paradigm has

contributed considerably to SSCM research, particularly in terms of managerial insights and theoretical implications due to its emphasis on theory testing (Mangan et al., 2004).

### **4.3.2 Interpretivism**

The interpretivist paradigm has also been employed in SSCM studies, although it does not involve investigating the social world according to the scientific method, as does positivism because it is too complex (Saunders et al., 2009). Bryman and Bell (2015) maintain that interpretivism proposes that the social world can only be comprehended and interpreted from the perspective of the individuals being investigated by the researcher. Bryman (2001) emphasises that in interpretivism, the reality is comprehended through the intervention in and the interpretation of reality, which is dynamic and evolving and comprises an extensive range of subjective realities or social acts that require interpretation (Lu, 2017). In addition, Mangan et al. (2004) maintain that interpretivism argues that the many interpretations of reality are portions of scientific knowledge.

Contrary to the positivism paradigm, interpretivism entails qualitative research methods and not the numerical measurement of quantitative data (Burrell & Morgan, 2000). Morgan et al. (2004) claim that interpretivism entails collecting rich, detailed and verbal data leading to empirical findings, as opposed to numerical data the analysis of which in quantitative research leads to empirical results. Moreover, Saunders et al. (2009) maintain interpretivism might require the researcher to induce the phenomenon under study.

### **4.3.3 Pragmatic Paradigm**

A research study that combines both positivist and interpretivist philosophies, such as the current study, follows the pragmatic paradigm. The pragmatic paradigm is adopted by philosophers who contend the real world should not be investigated according to one paradigm or method and that a mixture of methods should be used to understand a phenomenon fully (Tashakkori & Teddlie,

2003; Alise & Teddlie, 2010). This mixed-methods approach was selected for the study, as other researchers have followed the pragmatic paradigm in studying SSCM (Saunders et al., 2012; Golicic & Davis, 2012; Mangan et al., 2004; Nuerthey, 2015).

#### **4.4 Quantitative and qualitative research**

According to Tuli (2010) and Saunders et al (2012), social science researchers choose quantitative or qualitative research methods or both, depending on the epistemology (the nature of knowledge) “and ontology (the nature of reality) of the study. Creswell and Creswell (2017) emphasise that the quantitative research method involves postpositive claims for developing knowledge: the use of measurement and observation; cause and effect thinking; the reduction of the phenomenon to specific variables, hypotheses and questions; and testing” theories. Creswell and Creswell (2017) add that quantitative research uses surveys and experiments based on predetermined instruments to collect data, which are statistically analysed.

Qualitative research may involve a grounded theory methodology with an investigator having no previous knowledge of the phenomenon, which means that hypotheses and theories are constructed after data analysis as a result of inductive reasoning (Bryman & Bell, 2015). In addition, a qualitative study may begin with prepositions and continue scientifically and empirically to test them during the research process (Cavana et al., 2009; Saunders et al., 2012). Qualitative research is conducted in in-depth case studies of a purposively sampled small group participants to understand a phenomenon (Stake, 1995; Saunders et al., 2009; Lu, 2017).

In the current study, both quantitative and qualitative data collection methods were used, which meant that mixed-methods research was conducted. Creswell and Creswell (2013) and Grant and Booth (2009) support mixed-methods research, which has become popular in social science. Grant and Booth (2009) maintain that mixed-methods research facilitates a clear understanding of the

phenomenon by combining verbal, qualitative data and numerical, quantitative data. In the current study, quantitative data would be collected from procurement officers and community members, whereas selected management staff, such as accountants, chief executive officers (CEOs) and procurement officers of the various firms under study, were interviewed to provide the qualitative data.

#### **4.5 Study site**

The study was conducted in Ghana's manufacturing sector, the second-largest economy in West Africa. In 2019, it was identified as one of the fastest-growing economies in the region (IMF, 2020). Ghana comprises 16 regions, each with its particular economic activities, although the manufacturing sector is represented in the Ashanti, the Greater Accra, the Bono, and the Western Regions. In each of these regions, manufacturing activities take place in regional capitals: Kumasi, Accra/Tema, Sunyani and Takoradi where the study was conducted.

#### **4.6 Target population**

A research target population is a large, total group of individuals about which information is required (Yin, 2003). In the study, the smaller study population, from which the sample was drawn, comprised staff of the manufacturing firms and the residents of the various metropolitan areas, municipalities and districts in the above-mentioned four regions where manufacturing is carried out in Ghana.

In ascending order, the topmost five manufacturing subsectors in Ghana are textiles (9%), other non-metallic products (9%), chemicals and chemical products (13%), paper and paper products (19%), and food and beverages (30%). In Ghana, the last time an industrial survey was carried out was 2003, when approximately 27,000 manufacturing firms employed about 244 000 individuals. Only 4% of the manufacturing firms were large enterprises employing more than 100 people; 9%

were medium enterprises employing between 20-99 people; 36% were small enterprises employing 5-19 people, and 51% were micro-enterprises employing less than four people. Of those employed in Ghana, large enterprises accounted for 34%, SMEs employed 51% and micro-enterprises accounted for 15%. The majority of the firms were situated in the Ashanti and the Greater Accra Regions. The Ashanti Region had 24% of the firms and 24% of employees, while the Greater Accra Region had 25% of the firms and 27% of the employees (Nti, 2015, Adarkwah et al., 2018). The number of manufacturing firms in the study area was 1900.

#### **4.7 Sampling and sample size**

Sampling is the method of choosing sufficient elements/individuals from a study population. Sampling techniques also denote the process employed in choosing the sample. Several techniques have been described by several researchers, which comprise snowballing and convenience, purposive, simple random and systematic sampling, among others (Saunders et al., 2012; Creswell & Creswell, 2013).

This study used the purposive sampling technique, which is sometimes referred to as subjective, selective or judgemental sampling, which is a form of non-probability sampling and entails researchers depending on their judgement to choose respondents from a study population to take part in a study. The purposive sampling technique requires investigators to have prior knowledge of the study's aim to select appropriate respondents who fit a particular profile (Bryman & Bell, 2015).

In the study, the purposive sampling method was used to select firms with an annual turnover of not less than one million dollars (\$1,000,000) within the study area. Moreover, the staff (particularly procurement officers) of the selected firms were purposively selected, which meant not every firm or staff member within the study area was selected. In addition, the nearby residents

where the firms operate were purposively selected. The study employed a purposive sampling method because introducing randomisation (the probability method) as a sampling procedure could bias the research outcomes. Therefore, the right manufacturing firms and the right respondents (staff and nearby residents) had to be chosen.

A sample size denotes the number of observations made, cases studied or replicates carried out for each of the identified variables to reach statistically significant research answers. Most academics who use structural equation modelling (SEM) differ on the exact number of respondents that should be used in a study (Iacobucci, 2010). Again, Wolf et al., (2013) criticise any effort to have a conventional, concrete number when employing SEM, particularly when one takes into account variables like model complexity, the quantity of missing data and the magnitude of factor loadings (Morrison et al., 2017). However, there are recommendations for the bare minimum of responses needed to use SEM. A minimum of 180 samples is recommended when utilising sophisticated mediation models according to research (Wolf et al., 2013) that used Monte Carlo simulation.

In the study, the number of respondents was selected based on the guidelines of Krejcie & Morgan (1970). According to the authors, a sample size from a population is determined using the following formula:

$$s = X^2 NP(1 - P) \div d^2(N - 1) + X^2 P(1 - P).$$

where

$s$  = required sample size.

$X^2$  = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

$N$  = the population size.

$P$  = the population proportion (assumed to be .50 since this would provide the maximum sample size).

$d$  = the degree of accuracy expressed as a proportion (.05).

Therefore, based on the formula, the sample size from an estimated study population of 1900 was determined as follows.

$$s = X^2 NP (1-P)/d^2 (N-1) + X^2 P (1-P)$$

$$s = 3.841 \times 1900 / \times 0.50 (1-0.50)/0.05^2(1900-1) + 3.841 \times 0.50 (1-0.50)$$

$$s = 3648.95 (0.50) / 0.0025(1899) + 1.92 (0.50)$$

$$s = 1824.46 / 4.75 + 0.96$$

$$s = 1824.46 / 5.70$$

$$s = 320$$

Although 320 questionnaires were handed out to participants, only 303 questionnaires were completed and returned, which was a response rate of 95% and sufficient for statistical analysis (Krejcie et al., 1970). When seen in light of the above arguments, the sample size of 303 in the research was not only appropriate but also significant.



The study respondents comprised procurement officers of the selected firms. The selection of the respondents from each region is stated in Table 4.1 below.

Region	Number of manufacturing firms	Number of manufacturing firms selected	Number of respondents	Questionnaires retrieved
Greater Accra	582	98	98	91
Ashanti	550	93	93	87
Western	416	70	70	68
Bono	352	59	59	57
Total	1900	320	320	303

*Source: Field survey (2022)*

#### **4.8 Data Collection Methods**

In the study, quantitative and qualitative data collection methods were employed, including a survey using questionnaires and interviews.

##### **4.8.1 Questionnaire**

Robson and McCartan (2016) mention that “a questionnaire is a research instrument consisting of a set of questions that intend to gather data from a respondent. Typically, a questionnaire is made up of closed- or open-ended questions. Closed-ended questions propose a list of possible answers” to the research questions, thereby making it simpler for respondents to choose an answer. Closed-ended questions also make it easier for the researcher to compare the responses provided by participants. Open-ended questions are employed to do away with the bias that could take place owing to the proposing of answers to research respondents (Reja et al., 2003).

A questionnaire was used in the study because it can reach many participants. However, only closed-ended questions were included in the questionnaire to enable easy analysis. The questionnaires consisted of Likert-scale questions. The answers to the questions were measured according to “a five-point Likert scale whereby respondents had to choose from the following statements to indicate their response to the questions: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA). The study used a mix of e-questionnaire and hard-copy questionnaires to reach the study’s participants. The study used six (6) months to distribute and collect data from participants. During this period, three hundred and twenty (320) participants were reached from manufacturing firms in the Ashanti Region, Greater Accra, Bono and Western Region of Ghana. 303 responses were received, and used for the analysis.

Multi-item scales like the Likert scale are popular because of three reasons. Firstly, many items have the potential to depict a broader conception than a single question. Secondly, the usage of several items can help in illustrating the fine distinctions between items. Lastly, if a respondent misconstrues any of the questions, and only one question is asked, that response may not be properly interpreted (Bryman & Bell, 2015).

The questions consisted of Sections I to V, and the questionnaire is attached to this report (see the questionnaire in Appendix A1):

1. Section I dealt with the demographics of the firms under study.
2. Section II solicited data on the SSCM practices of the targeted manufacturing firms in Ghana.
3. Section III investigated factors that influence Ghanaian manufacturing firms’ adoption of SSCM practices.

4. Section IV assessed the impact of SSCM on the performance of the manufacturing firms under study.
5. Section V investigated the barriers to adopting SSCM among the manufacturing firms in Ghana.

Table 4.1 below presents the questionnaire model used in the study.

*Table 4.1: Questionnaire model*

<b>Construct</b>	<b>Variables</b>	<b>Number of questionnaire items</b>	<b>Literature source</b>
SSCM practices	*Sustainable product design (SPD)	7	Carter and Easton (2011), Paulraj et al. (2017)
	*Sustainable process design (SP)	5	Zhu and Sarkis (2004), De Giovanni (2012), Wong et al. (2012)
	*Supply-side sustainability collaboration (SSC)	7	Carter (2000), Vachon and Klassen (2006), Shi et al. (2012), Zhu et al., (2012)
	*Demand-side sustainability collaboration (DSC)	5	Vachon and Klassen (2006), Paulraj et al. (2017)

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Factors			
influencing	*Instrumental	5	Bansal and Clelland (2004),
the adoption	factors (IF)		McWouldiams and Siegel (2011)
of SSCM			
	*Relational	5	Buysse and Verbeke, (2003), Delmas
	factors (RF)		and Toffel (2008), Tate et al. (2010),
			Hofer et al. (2012)
	*Moral factors	4	Logsdon and Wood (2002),
	(MF)		Cantor et al. (2012)
	*Knowledge	3	Paulraj et al. (2017)
	factors (KF)		
Performance	*Environmental	6	Zhu and Sarkis (2004), Zhu et al.
	performance (EP)		(2013).
	*Economic	7	Bowen et al. (2001), Zhu et al. (2008),
	performance		Ameer and Othman (2012)
	(EcP)		
	*Social	7	Hoffman and Haigh (2001), Testa and
	performance (SP)		Iraldo (2010), Xie and Breen (2012)
			Linton et al. (2007), Seuring and
Barriers	*Challenges (C)	6	Muller (2008), Carter and Rogers
			(2008), Morali and Searcy (2010a)
	*Inhibiting factors	6	Asare and Prempeh (2016)
	(IF)		

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*Source: Author's construct (2022)*

#### **4.8.2 Interviews**

The study also used qualitative interviews to collect data to obtain insights from community members residing around the selected manufacturing firms in Ghana. The use of interviews provided an opportunity for the researchers to obtain in-depth information on the participants' perceptions, attitudes, and experiences regarding the adoption of sustainable supply chain management practices by the selected manufacturing firms. The study targeted community members living around these selected firms because their lives and livelihoods are affected by the firms' operations. Thus, their opinions on the firms' adoption of SSCM practices are essential in understanding the firms' impact on their local environment and community.

A total of 20 community members participated in the interviews, which were conducted on a one-on-one basis. One-on-one interactions allowed for open and honest conversations between the interviewer and the interviewee, enabling the interviewer to gather detailed information and perspectives from each participant. The interviews were conducted in various households in the neighbourhoods around the various manufacturing firms over the course of two (2) months. The duration of each person for the interview was between 30 minutes and 45 minutes. Additionally, the use of interviews allowed for the exploration of new themes and ideas that were not covered in the quantitative survey.

However, there are limitations to using interviews as a data collection method. One of the major limitations is the potential for interviewer bias. The interviewer's personal biases, beliefs, and experiences may influence the way questions are asked or interpreted, leading to a skewed representation of the participants' responses. The interview process was structured and guided by open-ended questions (see interview schedule in Appendix A2). The interviews were conducted

in the local language, which facilitated communication and understanding between the participants and the researchers.

#### **4.9 Theoretical Framework and Variables in the Study**

All six of the theories cited in this study apply to the variables. According to contingency theory, certain contextual circumstances, such as the firm's size or the market's level of competitiveness, may have an impact on the relationship between sustainable supply chain management practices and firm performance. This theory relates to the variables in the study, instrumental factors, relational factors, and knowledge factors, which may all have an impact on the efficacy of sustainable supply chain management strategies in various circumstances. Also, according to the resource-based view theory, a company's special assets and skills, such as its capacity to develop environmentally friendly goods and procedures or to interact successfully with suppliers and clients, may provide a source of competitive advantage. This theory relates to the study's variables of sustainable process design, supply-side collaboration on sustainability, and demand-side collaboration on sustainability.

According to the relational-view theory, effective stakeholder engagement and communication are essential for accomplishing sustainable supply chain management objectives. The variables of supply-side sustainability collaboration and demand-side sustainability collaboration in the study are related to this theory. Additionally, the innovation diffusion theory considers a number of variables, including perceived advantages, compatibility with current practices, and practice complexity, that may impact the adoption and spread of sustainable supply chain management techniques. This theory pertains to the variables of instrumental, relational, moral, and knowledge factors in the study.

Moreover, the stakeholder theory suggests that businesses should take into account the interests of all parties involved, not just shareholders when making decisions. This theory relates to the study's environmental, economic, and social performance variables, all of which could be influenced by the use of sustainable supply chain management practices. Finally, the resource dependence theory also argues that companies may need to work with other organisations to obtain resources and lessen their reliance on specific suppliers or clients. This theory is relevant to the study's supply-side and demand-side sustainability collaboration variables, which may include working with outside stakeholders to assess the challenges and inhibiting factors to adopting SSCM among manufacturing firms. Table 4.2 presents the theories and how they link to the study's variables.

**Table 4.2: Theoretical Framework and Variables in the Study**

<b>Theories</b>	<b>Variables</b>
Contingency Theory	Instrumental Factors (IF), Relational Factors (RF), Moral Factors (MF), and Knowledge Factors (KF)
Resource-Based View (RBV)	Sustainable product design (SPD), Sustainable process design (SP), Supply-side sustainability collaboration (SSC), and Demand-side sustainability collaboration (DSC)
Relational-View Theory (RVT)	Supply-side sustainability collaboration (SSC) and Demand-side Sustainability Collaboration (DSC)
Innovation Diffusion Theory	Instrumental factors (IF), Relational factors (RF), Moral factors (MF), and Knowledge factors (KF)
Stakeholder Theory	Environmental performance (EP), Economic performance (EcP), and Social performance (SP)
Resource Dependence Theory (RDT)	Challenges (C), and Inhibiting Factors (IF) via Supply-side sustainability collaboration (SSC) and Demand-side Sustainability Collaboration (DSC)

*Source: Author's construct (2022)*

#### **4.10 Data quality control**

Data quality control has increasingly become a discussion topic in research. According to Creswell and Creswell (2017), data quality control involves evaluating whether the research methodology used by a researcher guarantees the quality and accuracy of the data collected for a study. The evaluation begins with ensuring that a rigorous research design indicating the methodology is formulated. In addition, the data collection instruments were checked by a research supervisor and independent individuals with considerable knowledge of the research topic and research methodology.

In the case of a questionnaire, the instrument was piloted in selected manufacturing firms for the researcher to know whether respondents would understand the questions. Moreover, their views were incorporated into the questionnaire after the pilot test. The questions were slightly altered after the pilot stage. The internal consistency of the questionnaire items was determined through the calculation of Cronbach's alpha, which examines the extent to which all the questionnaire items related to both the total test and one another (Gay & Airasian, 2003). The questionnaire items are unacceptable if the alpha coefficient is less than 0.5. An alpha coefficient between 0.5 and 0.6 indicates that the items are poor or questionable. However, if it is above 0.7, then the items are acceptable. The Cronbach's alpha of the items in the questionnaire of the current study was 0.81, which indicated internal consistency.

The interviews were recorded with the written consent of the participants. After the transcription of the interview, it was sent to each participant for validation and confirmation that it captured their statements, views and suggestions.



## **4.11 Methods of data analysis**

The analyses of the qualitative and quantitative data differed in that the former involved discovering themes in the raw, verbal data, whereas the latter entailed converting the raw, numerical data into statistics.

### **4.11.1 Qualitative Data Analysis**

When analysing qualitative data, the investigator makes sense of the words by making the ideas manageable and grouping them into themes (Creswell, 2009). “Various qualitative data analysis methods, such as constant comparison, pattern matching, and content analysis According to Shaw (1999), investigators need to introduce clarity into the mass of gathered data to develop a theory and add to current understanding and knowledge. In the current study, the qualitative interview data were analysed using Cope’s (2005) four stages of data analysis (Stages 1 to 4), as explained by Ponelis (2015).”

#### **✓ Stage 1: Analysis of recording transcripts and notes**

The transcripts of the recordings and notes are read several times with the investigator making comprehensive comments in the margins and underlining words that relate to noteworthy ideas “(Patton, 2002). According to Easterby-Smith et al. (1991), this facilitates familiarisation with the data and begins the process of arranging and putting the data together, until themes, categories and patterns emerge from the raw data. In the study, the researcher reviewed all notes after each interview and added extra notes for detail and clarity. Again, the study used Microsoft Excel to record, process and analyse the qualitative interview data.”

### ✓ **Stage 2: Writing up case narratives**

Based on the framework of themes, categories and patterns identified or the chronology of events, a clear, convenient and rich case narrative for each participant is written to ensure a cross-case analysis and the transferability of the findings, thereby increasing reliability.

In the current study, the narrative was presented both thematically and chronologically to clarify the findings of SSCM practices amongst manufacturing firms in Ghana. The narratives were shared with respondents for verification that they correctly interpreted the respondents' words and to remove any misinterpretation, thereby enhancing the integrity of the research (Creswell, 2009). The informants amended none of the interview transcripts after the interview.

### ✓ **Stage 3: Determining findings through cross-case analysis**

According to Stake (2005), cross-case comparisons facilitate the identification of similarities and differences, which leads to a “cohesive description across categories, cases, typologies, or themes that hypothesise the data and the construction of an integrated framework covering multiple cases (Merriam, 2009).”

The qualitative content analysis comprises ascertaining general themes and categories in the data, which are given codes. Moreover, the investigator notes “observations or quotations that match, that are examples of the same principal concept, idea or issue” (Liao et al., 2017).

### ✓ **Stage 4: Interpreting the findings and enfolding the literature**

The thematic findings of Stage 3 of the data analysis are interpreted and linked to the relevant theoretical literature in Stage 4 (Hamid & Isa, 2016). Eisenhardt (1989) refers to this as enfolding the literature to assess whether the findings of the data analysis confirmed or rejected those of previous studies or various theories.

## ✓ Stage 5: Writing up and concluding the qualitative study

According to Yin (2009), the most used technique of writing a qualitative research report is to produce a convincing story that depends on the rich pictures of a descriptive narrative. Merriam (2009) mentions that the write up of a qualitative study should be more descriptive than other kinds of research to present a holistic understanding of the phenomenon, although the extent of analysis, description, or summary included in the write up is up to the researcher.”

Stake (2005) highlights that the researcher must decide

- How plentiful to make the report
- How extensively the report should relate to other cases
- How extensively the report should formulate generalisations and how much should be left to the readers to make
- How much description should be included in the report
- Whether to protect anonymity and to what degree

The choices made in response to the above statements would vary for each study and depend on the research questions.

According to Gorman and Clayton (2005), the reliability of qualitative findings depends on the degree of subjectivity in the researcher’s interpretation of the data during the analysis and the linking of the findings to the participants’ words in the research report to justify the judgments made.

A qualitative research report can conclude with either implications or recommendations. Although recommendations are more direct, the shortcomings of generalising qualitative cross-case analysis

findings in stage 3 of analysis, and comparing discoveries findings make them risky and therefore it might be better to present the implications of the findings (Dubey et al., 2016, 2017).

**4.11.2 Quantitative Data Analysis**

The data gathered through the questionnaire were analysed statistically. The data from Section 1 of the questionnaire were analysed to produce descriptive statistics about the participants’ demographic profile. The analysis of the data from Sections II to V is explained in the following sections. Sections II, III, IV and V gathered data on SSCM practices, factors influencing SSCM adoption, the effect of SSCM on production and barriers to the adoption of SSCM in manufacturing firms in Ghana, respectively.

**4.11.2.1 SSCM Practices Amongst Manufacturing Firms in Ghana**

The statistical analysis of the data gathered on SSCM practices amongst manufacturing firms in Ghana is explained in this section.

A weighted average index was used to investigate SSCM Practices among manufacturing firms in Ghana (see Equation 1 below). Each number is multiplied by its weight to obtain the weighted average, and then the results are added. If the weights do not add up to one, the sum of all the numbers multiplied by their weight is found, which is divided by the sum of the weights (Lent & Dorfman, 2009).

$$\text{Weighted average} = \frac{1a_1v_1+a_2v_2+\dots+a_nv_n}{a_1+a_2+\dots+a_n} \dots\dots\dots (1)$$

**4.11.2.2 Factors Influencing the Adoption of SSCM Amongst Manufacturing Firms in Ghana**

The factors influencing the adoption of SSCM amongst manufacturing firms in Ghana were determined by totalling the frequency of the respondents’ responses to the statements about specific factors. The structural equation model (SEM) was used to empirically examine the factors, and the statistics were organised in tables using IBM SPSS 26 and SmartPLS 3.3.

#### 4.11.2.3 The Impact of SSCM on the Performance of Manufacturing Firms in Ghana

The SEM was used to analyse the data on the impact of SSCM on the performance of manufacturing firms in Ghana. The statistics generated were organised in tables using IBM SPSS 26 and SmartPLS 3.3.

#### 4.11.2.4 Barriers to the Adoption of SSCM Amongst Manufacturing Firms in Ghana

The frequency of the respondent's responses to statements about barriers to the adoption of SSCM was totalled, and Garret's Ranking Technique would be used to rank the barriers by using the formula indicated in Equation 2 below.

$$\text{Percent position} = \frac{100 (R_{ij} - 0.5)}{N_j} \dots\dots\dots (2)$$

where  $R_{ij}$  = rank given for the  $i^{\text{th}}$  problem by the  $j^{\text{th}}$  manufacturing firm

$N_j$  = number of barriers ranked by the  $j^{\text{th}}$  manufacturing firm.

With the aid of Garrett's Ranking Conversion Table, the percent position calculation would be converted into scores. For each barrier, the scores of each firm would be added, and the total and average values of the score would be estimated. The barrier with the highest average value would be deemed the most significant (Dhanavandan, 2016).

### 4.12 Ethical considerations

Researchers "are required to protect the respondents in their study, develop their trust, safeguard them against wrongdoing and irregularities, which may be a bad reflection of the research institution, and handle challenges (Merriam and Tisdell, 2015). Ethical considerations, which guided the current study, were the obtaining of ethical clearance from the Humanities and Social Science Research Ethics Committee of the University of KwaZulu-Natal and" permission from the various manufacturing firms to conduct the study before the research could begin (see ethical clearance letter at Appendix D). Respondents' informed consent was obtained, and their

anonymity, the confidentiality of their information, their voluntary participation and were assured. Furthermore, all tools used and authors consulted would be appropriately referenced and quoted, and the role of every person who contributes to the study was acknowledged.

#### **4.13 Limitations of the study**

This “research was limited to the SSCM practices of selected manufacturing firms in Ghana. The services, construction, oil and gas and mining sectors were beyond the scope of the study. Consequently, the empirical research that would be carried out was” limited to manufacturing firms in the Greater Accra, the Ashanti, the Western and the Bono Regions of Ghana. The findings of the study, therefore, might not be a true reflection of all Ghanaian manufacturing firms. Moreover, since firms must practice SSCM, some of the responses from the firms may have been misleading, as they may not have given accurate information for fear of exposing their firms’ non-compliance. Nonetheless, the respondents were encouraged to be transparent, as the research was limited to academic purposes.

## **CHAPTER 5 FINDING AND RESULTS**

### **5.1 Introduction**

“This chapter firstly introduces the data analysis process and then presents the results of the descriptive statistical data analysis. Thereafter, the tests conducted on the measurement model, which comprised the constructs/variables included in the questionnaire are explained. The last part of the chapter presents the results of the inferential statistical analysis and the findings of the analysis of the qualitative data.”

Data analysis is the process whereby a substantial volume of data is turned into relevant information that can be utilised for decision-making and policy formulation. Descriptive and inferential statistical analyses were conducted to minimise the volume of the quantitative data collected through the questionnaire completed by employees of manufacturing firms in Ghana.

The descriptive statistics were developed using IBM SPSS version 26, and the inferential statistics were computed using SmartPLS 3 by Ringle et al., (2015).

Thematic analysis was conducted on the data gathered through interviews with Ghanaian community members.

### **5.2 Descriptive Statistical Analysis Results**

Descriptive, statistical data analysis is undertaken before the inferential statistical analysis in explanatory studies, which in the current study entailed dissecting the participants' responses to the questionnaire statements in terms of their extent of agreement or disagreement (Kemp et al., 2018). Thus, before the inferential statistical analysis, which includes “estimating the relationship between a dependent variable and one or more independent variables (regression analysis) and” determining causality between variables (correlation analysis), the data were subjected to descriptive measures of central tendency, such as the mean, and their standard deviation was

calculated. Pallant (2011) argues that descriptive statistics allows a researcher to assess the study variables.

In the study, descriptive statistics, such as means and standard deviations, summarised the data, which led to the formulation of the demographic profile of the firms represented by the participants and their positions in them. In addition, descriptive statistics led to the attainment of the four research objectives by summarising the participants' perceptions of the SSCM practices in their firms; the factors influencing the adoption of SSCM by their firms; the impact of SSCM on their firms' performance; and the barriers the firms experience when adopting SSCM.

### **5.2.1. Demographic Characteristics of Manufacturing Firms and Respondents' Positions**

As indicated in Table 5.1 below, of the manufacturing firms that participated in the study, 75 manufactured textiles. These 75 firms made up 24% of the manufacturing firms under study. Only 8 (2.6%) of these firms manufactured non-metallic products, 44 (14.5%) manufactured chemicals and chemical products and 38 (12.5%) manufactured paper and paper products. The majority of the firm (138 or 45.5%) manufactured food and beverages, which, therefore, dominated the manufacturing sector in Ghana.

In terms of the position, they held in the firms, the majority (281 or 92.7%) of the participants were procurement officers, 16 (5.3%) were accountants and the remaining few (6 or 2%) were CEOs.

Of the participants' manufacturing firms, the majority (106 or 35%) had been in existence for five years or more. In total, 80 or 26.4% of the respondents' firms had been in existence for three years, 55 or 18.2% for two years and 51 or 16.8% for four years. The remaining 3.6% (11) had been in existence for less than a year.



In terms of location, the majority of the manufacturing firms (132 or 43.6%) were located in Greater Accra, 80 or 26.4% were located in the Ashanti Region, 46 (15.2%) in the Bono Region and 45 (14.9%) in the Western Region.

In terms of ownership, the majority 212 (70%) were solely Ghanaian-owned, 26 (8.6%) were foreign-owned firms and the remaining 21.5% (65) were joint-venture firms.

In terms of average annual income, most (76% or 25.1%) of the manufacturing firms had an average annual income of \$3,000,000-\$4,000,000, which is quite high, whilst 73 (24.1%) had an average annual income of \$4,000,000-\$5,000,000, 51 (16.8%) had between \$2,000,000 and \$3,000,000, 45 (14.9%) had an annual income \$1,000,000-\$2,000,000 and 58 (19.1%) had an average annual income of above \$5,000,000.

In terms of the legal status of the firms, none were unregistered. Out of the 303 firms, 119 (39.3%) were registered as a sole proprietorship, whereas 88 (29%) were partnerships, 54 (17.8%) were limited liability companies and 42 (13.9 percent) were public limited liability companies.

Table 5.1 below provides an overview of the demographics of the firms represented by the participants and their positions in them.

Table 5.1: Demographic characteristics of firms and respondents' position

	Frequency	Percent
Total	303	100.0
<b>Type of manufacturing</b>		
Textiles	75	24.8
Non- metallic products	8	2.6
Chemicals and chemical products	44	14.5
Paper and paper products	38	12.5
Food and beverages	138	45.5
<b>Position</b>		
Chief executive officers	6	2.0
Accountants	16	5.3
Procurement officers	281	92.7
<b>Firm Existence (years)</b>		
Less than one year	11	3.6
Two years	55	18.2
Three years	80	26.4
Four years	51	16.8
Five years and above	106	35.0
<b>Location</b>		
Ashanti Region	80	26.4
Greater Accra Region	132	43.6
Bono Region	46	15.2
Western Region	45	14.9
<b>Ownership</b>		
Solely Ghanaian-owned	212	70.0
Foreign-owned	26	8.6
Joint ventureship	65	21.5
<b>Average Annual Income</b>		
1000000-2000000	45	14.9
2000000-3000000	51	16.8
3000000-4000000	76	25.1
4000000-5000000	73	24.1
Above 5000000	58	19.1
<b>Legal status</b>		
Not registered	0	0
Sole proprietorship	119	39.3
Limited liability	54	17.8
Public limited liability	42	13.9
Partnership	88	29.0

Source: Field survey (2022)

## 5.2.2 Participants' Responses to Questionnaire Items

The following sections and Tables 5.2, 5.3 and 5.4 below explain and present the descriptive statistics of the participants' responses to the questionnaire items.

### 5.2.2.1 *SSCM Practices*

As the first objective of the study was to evaluate the SSCM practices of manufacturing firms in Ghana, by responding to the questionnaire items (see Appendix A), respondents were asked to indicate their firms' SSCM practices: “sustainable product design; sustainable process design; supply-side sustainability collaboration and demand-side sustainability collaboration (Carter & Easton, 2011; Paulraj et al., 2017).”

#### (a) *Sustainable Product Design*

The first SSCM practice evaluated in the study was the design of sustainable products for energy reduction, product reuse/recycling and the recovery of materials, for example. A “five-point Likert was used to determine the respondents' level of agreement with the statements indicating specific sustainable product design practices. The five-point Likert scale ranged from ‘strongly disagree (1)’ to ‘strongly agree (5)’. The seven statements about sustainable product design, were sourced from Carter and Easton (2011) and Paulraj et al. (2017).” As indicated in Appendix A, the questionnaire items were as follows:

- Care is taken to reduce energy/material consumption
- Attention is paid to reuse, recycle, and/or recover material
- Products are designed to use environmentally-friendly materials
- Products are designed with standardised elements to facilitate reuse
- Products are designed for easy disassembly
- Life cycle analysis is used to evaluate the environmental impacts of our products

- There are formal procedures for environmental product design.

However, after factor analysis was conducted, the results of the analysis of items one and two were not taken into consideration when the outcomes were interpreted.

The data analysis results revealed that there was sustainable product design amongst the manufacturing firms under study. The manufacturing firms' mean for sustainable product design ranged from 4.439-4.452, implying that the respondents agreed that their firms practised sustainable product design.

There was agreement that products were designed with standardised elements to facilitate reuse. This questionnaire item had “a mean of 4.452 and a standard deviation of 0.827. In addition, the responses to the statement, “life cycle analysis is used to evaluate the environmental impacts of our products” had a mean of 4.449 and a standard deviation of 0.724. This shows that the representatives of the manufacturing firms in the study agree that life cycle analysis was used to evaluate the impacts of products on” the environment.

The respondents agreed that there were formal procedures for environmental product design with a mean of 4.439 and a standard deviation of 0.724. The responses to the remaining two questionnaire items on sustainable product design recorded a mean of 4.442. The responses to the statement, “products are designed to use environmentally- friendly materials” recorded a standard deviation of 0.742 and the responses to the statement “products are designed for easy disassembly” recorded a standard deviation of 0.746. This shows that the manufacturing firms used materials that could be disassembled easily and were environment friendly.

Table 5.2 below presents the descriptive statistics summarising the Ghanaian manufacturing firms' sustainable product design practices.

Table 5.2: Sustainable product design in Ghanaian manufacturing firms

<b>Sustainable product design</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Std. deviation</b>
Products are designed to use environmentally friendly materials	1	5	4.442	0.742
Products are designed with standardised elements to facilitate reuse	1	5	4.452	0.827
Products are designed for easy disassembly	1	5	4.442	0.746
Life cycle analysis is used to evaluate the environmental impacts of products	1	5	4.449	0.724
There are formal procedures for environmental product design	1	5	4.439	0.724

Source: Field survey (2022)

(b) *Sustainable Process Design*

The second SSCM practice evaluated in the study was the design of processes to attain sustainability goals, minimise the firms’ environmental impact and enhance the environmental friendliness of production. “A five-point Likert was used to determine the respondents’ level of agreement with the statements indicating specific sustainable process design practices. The five-point Likert scale ranged from ‘strongly disagree (1)’ to ‘strongly agree (5)’. The five statements about sustainable process design were sourced from Zhu and Sarkis (2004), De Giovanni” & Vinci (2012) and Wong et al. (2012). As indicated in Appendix A, the questionnaire items were as follows:

- Our processes are greatly reliant on sustainability goals
- Our existing processes are evaluated to minimise their impact on the environment
- There is a formal environmental guiding principle for process design
- Our processes are reengineered to minimise their environmental impact
- We enhance the environmental friendliness of our production.

The means of the responses to the above statements ranged from 4.442 to 4.488, which indicates that the representatives of the manufacturing firms in the study agreed that they practiced sustainable process design. Moreover, they agreed that their processes were reliant on sustainability goals, as the mean response was 4.442 with a standard deviation of 0.701. Similarly, they agreed that their existing processes were evaluated to minimise their impact on the environment with a mean response of 4.439 and a standard deviation of 0.737.

The results shown in Table 5.3 below show that there was general agreement that their process design was guided by environmental principles with the responses recording a mean of 4.488 and a standard deviation of 0.717). The respondents agreed that their processes had been reengineered to minimise their environmental impact. This questionnaire item recorded mean response of 4.482 and “a standard deviation of 0.707. This implies that the manufacturing firms’ processes had the environment in mind and ensured that they did not have a detrimental impact on the environment.”

The data analysis results revealed that the participants strongly agreed that their firms’ production processes were environmentally-friendly (mean = 4.528; standard deviation = 0.693). Therefore, these Ghanaian manufacturing firms complied with the recommendations of De Giovanni (2012) and Wong et al. (2012), who maintain that firms should design environmentally-friendly processes. Table 5.3 below presents the descriptive statistics summarising the Ghanaian manufacturing firms’ sustainable process design practices.

Table 5.3: Sustainable process design in Ghanaian manufacturing firms

Sustainable process design	Min	Max	Mean	Std. Deviation
Our processes are greatly reliant on sustainability goals	1	5	4.442	0.701
Our existing processes are evaluated to minimise their impact on the environment	1	5	4.439	0.737
There is a formal environment guiding principle for process design	1	5	4.488	0.717
Our processes are reengineered to minimise their environmental impact	1	5	4.482	0.707
We enhance the environmental friendliness of our production	1	5	4.528	0.693

Source: Field survey (2022)

(c) *Supply-side Sustainability Collaboration*

The third SSCM practice evaluated in the study was “supply-side sustainability collaboration, including teaming up with suppliers to attain sustainability goals; meeting suppliers’ requirements for their sustainability processes; and collaborating with suppliers to provide services/products that support sustainability objectives. A five-point Likert was used to determine the respondents’ level of agreement to the statements indicating specific supply-side sustainability collaboration practices. The five-point Likert scale ranged from ‘strongly disagree (1)’ to ‘strongly agree (5)’.” The five statements about supply-side sustainability collaboration were sourced from Carter (2000), Vachon and Klassen (2006), Shi et al. (2012) and Zhu, Sarkis and Lai (2013). However,

the third item was taken out upon factor analysis. As indicated in Appendix A, the questionnaire items were as follows:

- We team up with our suppliers to attain sustainability goals
- We provide our suppliers with sustainability requirements for their processes
- We team up with our suppliers to provide services and/or products that support our sustainability objectives
- We develop a mutual understanding of tasks with our suppliers concerning sustainability performance
- We carry out mutual planning with our suppliers to anticipate and solve problems related to sustainability
- We at times provide suppliers with feedback on their sustainability performance

The data analysis revealed that the minimum mean response concerning supply-side sustainability collaboration was 4.475 and the maximum e was 4.558. Thus, there was general agreement that the manufacturing firms demonstrated supply-side sustainability collaboration. This shows that the manufacturing firms cooperated with their suppliers to attain sustainability goals and gave the services, equipment, materials, requirement and feedback to help them achieve sustainability objectives.



The supply-side sustainability collaboration practice that recorded the lowest mean was indicated by the response to the statement on carrying out mutual planning with suppliers to anticipate and solve problems related to sustainability (mean = 4.475; standard deviation = 0.717). The remaining supply-side sustainability collaboration practice recorded a mean response of 4.495 or above, showing strong agreement with this supply-side sustainability collaboration practice.

The response to the item on meeting suppliers' requirements for their sustainability processes recorded a mean of 4.495 (standard deviation = 0.712). Table 5.4 below shows that respondents strongly agreed that they teamed up with their suppliers to attain sustainability goals, with a mean response of 4.528 and a standard deviation of 0.674.

Participants strongly agreed that they developed a mutual understanding of tasks with their suppliers concerning sustainability performance "with a mean response of 4.545 and a standard deviation of 0.663. The respondents agreed that the firms provided suppliers with feedback on their sustainability performance with a mean response of 4.558 and a standard deviation of 0.610."

When manufacturing firms provide their suppliers with feedback on their sustainability performance, the suppliers will work to ensure sustainability is achieved. Table 5.4 below presents the descriptive statistics summarising the Ghanaian manufacturing firms' supply-side sustainability collaboration practices.

Table 5.4: Supply-side sustainability collaboration in Ghanaian manufacturing firms

Supply side sustainability collaboration	Min	Max	Mean	Std. Deviation
We team up with our suppliers to attain sustainability goals	1	5	4.528	0.674
We provide our suppliers with sustainability requirements for their processes	1	5	4.495	0.712
We develop a mutual understanding of tasks with our suppliers concerning sustainability performance	1	5	4.545	0.663
We carry out mutual planning with our suppliers to anticipate and solve problems related to sustainability	1	5	4.475	0.717
We at times provide suppliers with feedback on their sustainability performance	2	5	4.558	0.610

Source: Field survey (2022)

(d) Demand-side Sustainability Collaboration

The last SSCM practice evaluated in the study was demand-side sustainability collaboration, including liaising with clients to attain sustainability goals, enhance their sustainability initiatives and provide services/products that back sustainability objectives. “A five-point Likert was used to determine the respondents’ level of agreement with the statements indicating specific demand-side sustainability collaboration practices. The five-point Likert scale ranged from ‘strongly disagree (1)’ to ‘strongly agree (5)’. The” five statements about demand-side sustainability collaboration and sustainable process design were sourced from Vachon and Klassen (2006) and Paulraj et al. (2017). As indicated in Appendix A, the questionnaire items were as follows:

- We liaise with our clients to attain sustainability goals

- We liaise with our clients to enhance their sustainability initiatives
- We team up with our clients to provide services and/or products that back our sustainability objectives
- We develop a common understanding of tasks with our clients concerning sustainability performance
- We carry out mutual planning with our customers to anticipate and solve problems related to sustainability

The minimum mean response regarding demand-side sustainability collaboration was 4.469 and the maximum was 4.56, with an average response of 4.561. This implies that there was general agreement that the firms practised demand-side sustainability collaboration practice. In addition, respondents generally agreed that they liaised with clients to attain sustainability goals with a mean response of 4.469 and a standard deviation of 0.693. Demand-side sustainability collaboration involves a purchasing company cooperating and jointly planning with its customers to attain the sustainability objectives.

The remaining four questionnaire items scored a mean response above 4.50, implying that the manufacturing firms practised demand-side sustainability collaboration. In other words, the participants strongly agreed that they teamed up with their clients to provide services and/or products that back their sustainability objectives (mean = 4.512, standard deviation = 0.649). Additionally, the participants strongly agreed that they carried out mutual planning with their customers to anticipate and solve problems related to sustainability (mean = 4.528, standard deviation = 0.623). Generally, the participants strongly agreed that they had developed a common understanding of tasks with clients concerning sustainability performance (mean = 4.538, standard

deviation = 0.63). Moreover, the respondents strongly agreed that they liaised with clients to enhance their sustainability initiatives (mean = 4.561, standard deviation = 0.641). Table 5.5 below presents the descriptive statistics summarising the Ghanaian manufacturing firms' demand-side sustainability collaboration practices

*Table 5.5: Demand-side sustainability collaboration in Ghanaian manufacturing firms*

Supply-side sustainability collaboration	Min	Max	Mean	Std. Deviation
We liaise with our clients to attain sustainability goals	1	5	4.469	0.693
We liaise with our clients to enhance their sustainability initiatives	1	5	4.561	0.641
We team up with our clients to provide services and/or products that back our sustainability objectives	1	5	4.512	0.649
We develop a common understanding of tasks with our clients concerning sustainability performance	1	5	4.538	0.653
We carry out mutual planning with our customers to anticipate and solve problems related to sustainability	2	5	4.528	0.623

*Source: Field survey (2022)*

#### 5.2.2.2 *Factors Influencing the Adoption of SSCM Practices y Manufacturing Firms in Ghana*

The “second objective of the study was to determine the factors influencing the adoption of SSCM practices by manufacturing firms in” Ghana. Several factors have an impact on the intensity (suppliers involved) and the level of integration (diversity and the number of initiatives taken) of SSCM chain practices. Numerous studies have focussed on the benefits of implementing SSCM practices and their impact on an organisation's performance as factors influencing adoption (Luthra et al., 2017). In general, companies understand the advantages of switching from traditional SCM to SSCM and adopt the practices to improve environmental, social and economic performance, with the latter contributing to a country’s GDP (Govindan & Jepsen, 2016).

To investigate the factors influencing the adoption of SSCM practices by manufacturing firms in Ghana, the questionnaire included several items categorised into instrumental, relational, moral and knowledge factors. Participants had to indicate the extent to which they agreed or disagreed that the factors listed influenced the adoption of SSCM practices in their firms. Their responses to the statements were measured according to a five-point Likert scale ranging from “Strongly disagree” (1) to “Strongly agree” (5).

Table “5.6 below presents the descriptive statistics (means and standard deviations) generated by the analysis of the data gathered from the participants’ responses to the items on the factors” influencing the adoption of SSCM practices by manufacturing firms in Ghana. The instrumental, relational, moral and knowledge factors to which the participants had to agree or disagree in varying degrees are indicated in the table with the means and standard deviations of the responses.

Table 5.6: Factors influencing the adoption of SSCM by manufacturing firms in Ghana

Item code	Item	Min	Max	Mean	Std. deviation
<b>Instrumental factors</b>					
IF01	To prevent poor publicity	1	5	4.505	0.684
IF02	Shareholders demand for sustainability improvements	2	5	4.548	0.605
IF03	To satisfy our shareholders	1	5	4.535	0.673
IF05	For long-term profitability	1	5	4.482	0.664
<b>Relational factors</b>					
RF01	To distinguish our firm from our competitors	1	5	4.564	0.615
RF02	To multiply our customer base	1	5	4.518	0.634
RF03	Sustainability regulation	1	5	4.607	0.581
RF04	Clients' awareness of green initiatives	1	5	4.505	0.664
RF06	Source of sustained competitive advantage	2	5	4.545	0.589
<b>Moral factors</b>					
MF01	As it is the correct thing to do	1	5	4.528	0.654
MF02	Due to genuine concern for the environment	1	5	4.472	0.702
MF03	Because we feel responsible for the environment	1	5	4.508	0.703
MF04	As top management deems environmental responsiveness as a crucial element of corporate strategy	2	5	4.545	0.627
<b>Knowledge factors</b>					
KF01	Information availability	2	5	4.531	0.623
KF02	Training and education	1	5	4.578	0.629
KF03	Health and safety	1	5	4.587	0.688

Source: Field survey (2022)

### *5.2.2.3. The impact of SSCM on the performance of manufacturing firms in Ghana*

The “third objective of the study was to determine the impact of SSCM practices on the performance of manufacturing firms in Ghana. The literature” review revealed that in the current business environment, firms need to realise economic, environmental and social performance objectives through SSCM policy, strategy and practices carried out by stakeholders.

To “investigate the impact of SSCM on the performance of manufacturing firms in Ghana, the questionnaire included several items categorised into environmental, social and economic performance, and participants had to indicate the extent to which they agreed or disagreed with statements about the impact of SSCM on their firms. Their responses to the statements were measured according to a five-point Likert scale ranging from” “Strongly disagree” (1) to “Strongly agree” (5).

The six questionnaire items on environmental performance were sourced from Zhu and Sarkis (2004) and Zhu et al. (2013), whilst the seven questionnaire items on economic performance were sourced from Bowen et al. (2001), Zhu et al. (2008) and Ameer and Othman (2012), and the seven items on social performance were sourced from Hoffman and Haigh (2011), Testa and Iraldo (2010), Xie and Breen (2012).

Table 5.7 below presents the descriptive statistics (means and standard deviations) generated by “the analysis of the data gathered from the participants’ responses to the items on the impact of SSCM practices on the performance manufacturing firms in Ghana. The economic, environmental and social performance” indicators to which the participants had to agree or disagree in varying degrees are clearly indicated in the table with the means and standard deviations of the responses.

Table 5.7: Impact of SSCM on the performance of manufacturing firms in Ghana

Item Code	Item	Min	Max	Mean	Std. Deviation
<b>Environmental performance</b>					
EP01	Improvement of a firm's environmental situation	1	5	4.574	0.655
EP02	Waste reduction	1	5	4.538	0.643
EP03	Air pollution reduction	1	5	4.479	0.717
EP04	Reduction of consumption for toxic/harmful materials	1	5	4.495	0.744
EP05	Reduction of environmental accidents frequency	1	5	4.558	0.686
EP06	Reduction in natural resources use	1	5	4.422	0.812
<b>Economic performance</b>					
ECP01	Cost reduction of purchased materials	1	5	4.469	0.698
ECP02	Cost reduction of energy use	1	5	4.482	0.693
ECP03	Fee reduction for waste discharge	1	5	4.512	0.669
ECP04	Improvement in earnings per share	1	5	4.492	0.698
ECP05	Improvement in return on investment	1	5	4.528	0.649
ECP06	Growth of sales	1	5	4.594	0.642
ECP07	Growth of profits			4.568	0.661
<b>Social performance</b>					
SSP01	Customer satisfaction improvement	1	5	4.564	0.651
SSP02	Improvement of firm's image in the customers eyes	1	5	4.587	0.664
SSP03	Investments improvement on social projects (e.g., sports, culture and education)	1	5	4.495	0.664
SSP04	Improvement in relations with community stakeholders, e.g., community activists and NGOs	2	5	4.515	0.644



Item Code	Item	Min	Max	Mean	Std. Deviation
SSP05	Improvement in employee education and training	2	5	4.512	0.649
SSP06	Improvement in employees' occupational safety and health	1	5	4.564	0.661
SSP07	Improvement in stakeholder betterment or welfare	1	5	4.518	0.703

*Source: Field survey (2022)*

Table “5.7 above shows that the mean of the responses to the statements on environmental performance ranged from 4.422 to 4.574, which indicated that participants agreed that SSCM had a strong impact on the environmental performance of manufacturing firms in Ghana.”

The mean of the responses to the statements on economic performance ranged from 4.469 to 4.594, which indicated that participants agreed that SSCM had a strong impact on the economic performance of manufacturing firms in Ghana.

The mean of the responses to the statements on social performance ranged from 4.495 to 4.587, which indicated that participants agreed that SSCM had a strong impact on the social performance of manufacturing firms in Ghana.

#### *5.2.2.4 Barriers to The Adoption of SSCM by Manufacturing Firms In Ghana*

The fourth objective of the study was to determine the barriers to the adoption of SSCM by manufacturing firms in Ghana. The literature review revealed that in the present business environment, many firms have moved from SCM to SSCM, although there are various challenges and inhibiting factors preventing them from successfully implementing the strategy.

To investigate the “barriers to the adoption of SSCM by manufacturing firms in Ghana, the questionnaire included several items categorised into challenges and inhibiting factors, and participants had to indicate the extent to which they agreed or disagreed with statements about the

barriers. Their responses to the statements were measured according to a five-point Likert scale ranging from “Strongly disagree” (1) to “Strongly agree” (5). The six questionnaire items on challenges were sourced from Linton et al. (2007), Seuring and Muller (2008), Carter and Rogers (2008) and” Morali and Searcy (2010a). The six questionnaire items on inhabiting factors were sourced from Asare and Prempeh (2016).

Table 5.8 below presents the descriptive statistics (means and standard deviations) generated by the “analysis of the data gathered from the participants’ responses to the items on the barriers to the adoption of SSCM by manufacturing firms in Ghana.” The challenges and inhibiting factors to which the participants had to agree or disagree in varying degrees are indicated in the table with the means and standard deviations of the responses.

Table 5.8 below shows that the mean of the responses to the statements on challenges ranged from 4.446 to 4.531, which indicated that participants strongly agreed that manufacturing firms faced challenges in implementing SSCM practices in Ghana.

The mean of the responses to the statements on inhibiting factors ranged from 4.376 to 4.505, which indicated that participants strongly agreed that manufacturing firms were affected by inhibiting factors when implementing SSCM practices in Ghana.

Generally, it was evident that the participants strongly agreed to the statements on the barriers to the adoption of SSCM by the manufacturing firms in Ghana because the mean ranged between 4.376 and 4.531 and the standard deviation between 0.725 and 0.848

Table 5.8 below presents the analysis of the quantitative data on the barriers to the adoption of SSCM by manufacturing firms in Ghana, which were gathered through the survey questionnaire.

Table 5.8: Barriers to the adoption of SSCM by manufacturing firms in Ghana

Item code	Item	Min	Max	Mean	Std. deviation
<b>Challenges</b>					
C01	Corporate culture	1	5	4.531	0.765
C02	Transparency of knowledge and information	1	5	4.485	0.735
C03	Capital investment commitments	1	5	4.446	0.773
C04	Alignment of corporate strategy with SSCM initiatives	1	5	4.452	0.725
C05	Measurement	1	5	4.446	0.729
C06	Supplier monitoring and risk management	1	5	4.479	0.761
<b>Inhibiting factors</b>					
INF01	Loyalty and commitment levels within the chain	1	5	4.482	0.726
INF02	Inadequacy of funds and technology	1	5	4.419	0.804
INF03	Inadequate experienced personnel	1	5	4.376	0.777
INF04	Infrastructural problems	1	5	4.469	0.799
INF05	Competition	1	5	4.439	0.81
INF06	Inadequate contribution towards research and development	1	5	4.505	0.848

*Source: Field survey (2022)*

### 5.3 Measurement model

Before a researcher uses partial least squares structural equation modelling (PLS-SEM) to test a conceptual framework or structural model with many constructs, the measurement model, such as the questionnaire in the study, needs to be evaluated by analysing the constructs and estimating relationships between them (Hair et al., 2021). In addition, every single item in the questionnaire was derived from a previously validated measure and was measured reflectively. Formative or

reflective measurement should be based on content, parsimony, and criterion validity, according to Diamantopoulos and Sigauw (2006). Thus, the revised scales could be used in similar studies, Moreover, the items for each scale were chosen to reflect the underlying construct to the greatest extent possible, and their removal did not alter the conceptual breadth of the underlying construct. Finally, following a reliability and validity test, various items were excluded from further analysis. In “the study, only reflective constructs were used, hence the validity and reliability of the initial measurement model must be tested” before ensuring the final structural model's validity and reliability. Based on several theoretical views on PLS-SEM use, the evaluation of the measurement model in the study was done with a primary emphasis on the reliability of the indicator, “convergent validity internal consistency for reliability and discriminant validity. The measurement model was subjected to exploratory factor analysis as part of the (PLS-SEM)” procedure to verify its reliability and validity.

The model reliability and validity testing results are shown in Table 5.9 below and the model structure is presented in Figure 5.1 below where the variables in the measurement model are represented as follows:

- SD                    sustainable product design
- SP                    sustainable process design
- SSC                   supply-side sustainability collaboration
- DSC                   demand-side sustainability collaboration
- IF                    instrumental factors
- KF                    knowledge factors
- MF                    moral factors
- RF                    Relational factors
- ECP                   economic performance
- EP                    environmental performance
- SSP                   social performance

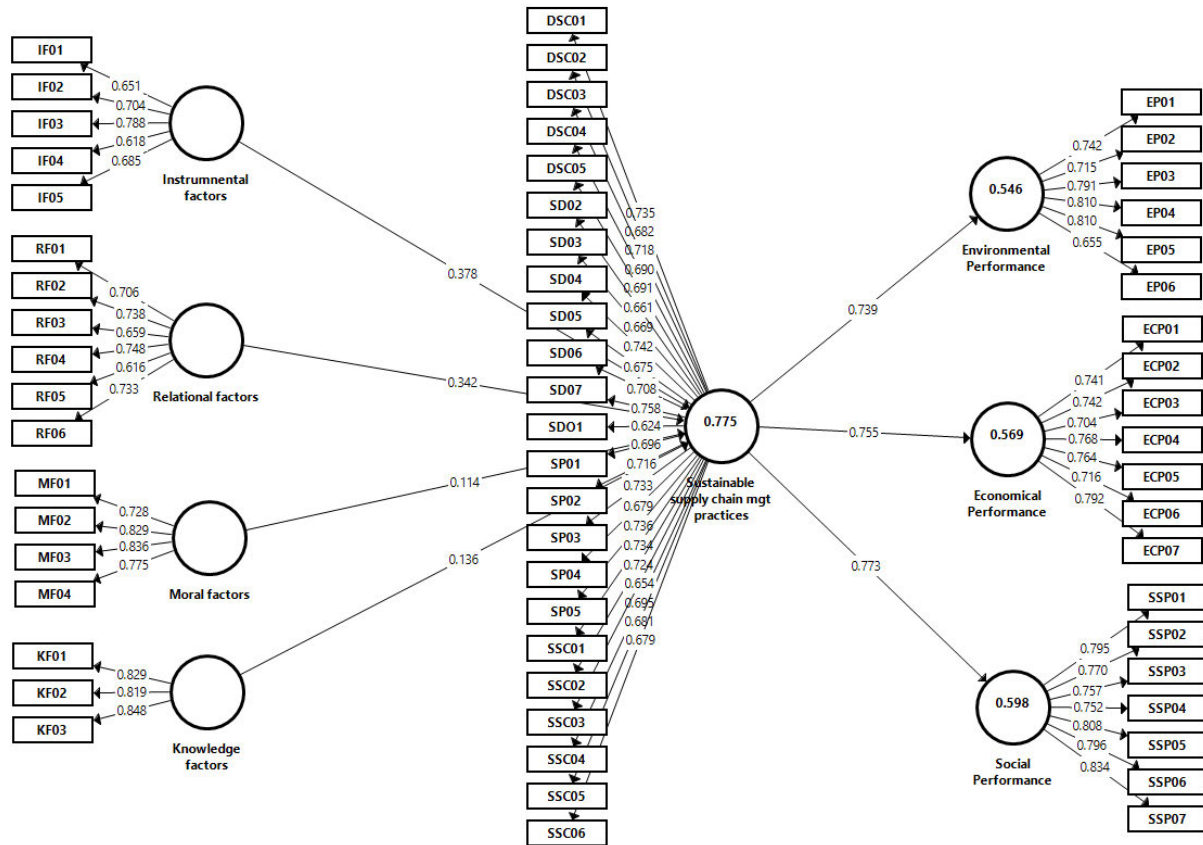


Figure 5.1: First measurement model

Source: Field survey (2022)

Table 5.9: Reliability and validity test results for the initial model

Main Construct	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Economic performance	0.868	0.870	0.899	0.559
Environmental performance	0.848	0.849	0.888	0.571
Instrumental factors	0.725	0.731	0.820	0.478
Knowledge factors	0.778	0.779	0.871	0.692

Moral factors	0.802	0.804	0.871	0.629
Relational factors	0.792	0.795	0.853	0.492
Social performance	0.898	0.901	0.920	0.621
Sustainable supply chain mgt practices	0.952	0.953	0.957	0.490

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*Source: Field survey (2022)*

The reliability and validity test results for the initial model presented in the table above show that the Cronbach alpha, rho\_A and composite reliability met the recommended thresholds. The average variance extracted (AVE) of the variables, instrumental factors, relational factors and sustainable supply chain management practices, did not meet the threshold of 0.5.

Based on the measurement criteria thresholds, the researcher then iteratively removed items with a lower loading from the model until all the indicator loadings, model fit indicators, reliability and validity thresholds met the recommended thresholds. Using the data in Table 5.9, the researcher was able to justify the exclusion of specific items from the model. From the SSCM practices construct in the model, SD01, SD02 and SSC03 were eliminated, and from instrumental and relational factors construct in the model, IF04 and RF05 were removed. The new model satisfied the measurement criteria threshold after iterative elimination of indicators with a lower loading.

The new model is shown in Figure 5.2 below.

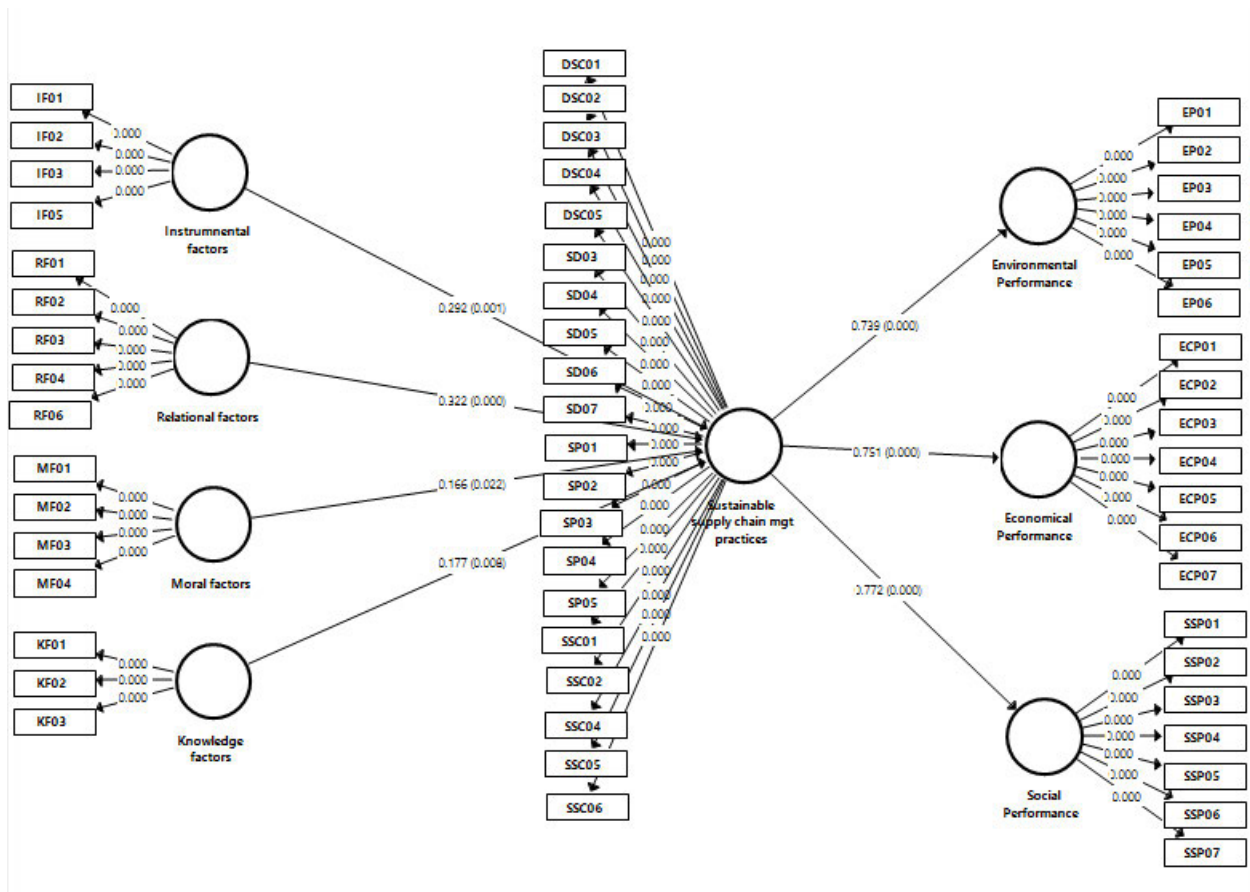


Figure 5.2: Final measurement model

*Source: Field survey (2022)*

### 5.3.1 Assessment of Reliability And Validity

Studies that primarily rely on self-reported questionnaires must conduct reliability and validity tests as a means of identifying potential problems. Validity measures how well the measuring instrument captures ideas and how accurate is the measurement, while reliability measures the consistency of the items. PLS-SEM data may be examined and interpreted using the rule of thumb, as suggested by Chin (2010) and Roldán and Sánchez-Franco (2012). Table 5.10 below summarises the measurement criteria threshold.

Table 5.10: Measurement criteria threshold

Measurement criteria	Recommended	Reference
Indicator loading	$\geq 0.7$ ; $>5$	Henseler et al. (2009), Götz et al. (2010), Chin, (1998)
Composite reliability	$\geq 0.60$	Hair et al. (2018)
Average variance extracted (AVE)	$> 0.50$	<u>Henseler et al. (2016)</u>
<u>rho_A</u>	$\geq 0.70$	Dijkstra & <u>Henseler (2015)</u>
HTMT ratio	$< 0.90$	<u>Henseler et al. (2016)</u>
Cronbach's alpha	$\geq 0.70$	<u>Henseler et al. (2015)</u>
Variance inflation factors	$\leq 3.3$	Kock (2015)

Source: Author's construct (2022)



### 5.3.1.1 Test for reliability

The study examined the “internal consistency reliability, which was based on composite reliability (Jöreskog, 1971). Cronbach’s alpha produces a less precise measure of reliability because it does not take into account the number of items, according to Hair et al. (2018). In contrast, composite reliability is weighted-based and was considered appropriate. Table 5.11 below shows the reliability results.”

*Table 5.11: Reliability Measures*

<b>Variables</b>	<b>Cronbach's Alpha</b>	<b>rho_A</b>	<b>Composite Reliability</b>	<b>AVE</b>
Economic Performance	0.868	0.870	0.898	0.559
Environmental Performance	0.848	0.849	0.888	0.571
Instrumental factors	0.715	0.724	0.824	0.540
Knowledge factors	0.778	0.779	0.871	0.692
Moral factors	0.802	0.804	0.871	0.629
Relational factors	0.784	0.787	0.853	0.537
Social performance	0.898	0.901	0.920	0.621
Sustainable supply chain mgt practices	0.948	0.949	0.953	0.503

*Source: Field survey (2022)*

Table 5.11 above shows that “composite reliability values range from 0.824 to 0.953. Values between 0.70 and 0.90 are described as “satisfactory to good”, but values of 0.95 and higher could indicate that some items are redundant, thereby reducing construct validity (Diamantopoulos et al.,

2012; Drolet & Morrison, 2001). Additionally, Dijkstra and Henseler (2015) support rho A as a measure of internal consistency reliability. This metric is viewed as a compromise between the more stable Cronbach's alpha and the more malleable composite reliability (Hair et al., 2018). In the study, all rho A values were more than 0.7 for all constructs, which was within the recommended threshold.”

#### 5.3.1.2 Convergent Validity

Testing “the convergent validity of the concept indicators was the next step. The average variance extracted (AVE) is used to assess convergent validity, and a value of 0.50 or higher indicates that a concept accounts for at least 50% of the variation in the underlying indicators. In the study, the AVE values of the indicators varied from 0.503 to 0.692. Because all AVEs explained at least 50% of the variance in their respective metrics, convergent validity was confirmed. The results are” presented in Table 5.12 below.

#### 5.3.1.3 Discriminant Validity

While convergent validity indicates an indicators' ability to measure or capture a shared “component, discriminant validity indicates the ability of two scales to measure distinct components within a measurement model (Henseler et al., 2015). According to Fornell and Larcker (1981), when the square root of a construct's AVE is greater than the correlation between the same construct and all other reflectively assessed constructs, discriminant validity is established. Table 5.12 below demonstrates that all values are below the threshold point, which indicates discriminant validity.”

Table 5.12: Inter-item correlation and square of AVE

	<b>ECP</b>	<b>EP</b>	<b>IF</b>	<b>KF</b>	<b>MF</b>	<b>RF</b>	<b>SSP</b>	<b>SSCM</b>
ECP	0.747							
EP	0.826	0.756						
IF	0.664	0.693	0.735					
KF	0.676	0.675	0.649	0.832				
MF	0.631	0.695	0.701	0.732	0.793			
RF	0.694	0.678	0.751	0.741	0.728	0.733		
SSP	0.84	0.818	0.708	0.701	0.682	0.725	0.788	
SSCM	0.751	0.739	0.765	0.727	0.735	0.794	0.772	0.71

Variables: IF - instrumental factors, KF - knowledge factors, MF - moral factors, RF - relational factors, ECP - economic performance, EP - environmental performance, SSP - social performance, SSCM - sustainable supply chain management practices.

Source: Field survey (2022)

However, many researchers “have shown that this criterion is not suitable when the indicator loadings differ slightly. Therefore, a more robust approach known as the Heterotrait-Monotrait ratio of correlations (HTMT) is supported as a substitute by Henseler et al. (2015) (see Table 5.13 below). According to this new criterion, discriminant validity is not attained if HTMT values are” more than 1.0.

*Table 5.13: HTMT*

	<b>ECP</b>	<b>EP</b>	<b>IF</b>	<b>KF</b>	<b>MF</b>	<b>RF</b>	<b>SSP</b>
ECP							
EP	0.963						
IF	0.838	0.888					
KF	0.824	0.831	0.873				
MF	0.756	0.843	0.928	0.928			
RF	0.838	0.828	0.994	0.949	0.919		
SSP	0.95	0.937	0.878	0.839	0.803	0.858	
SSCM	0.823	0.82	0.924	0.844	0.841	0.917	0.831

Variables: IF - instrumental factors, KF - knowledge factors, MF - moral factors, RF - relational factors, ECP - economic performance, EP - environmental performance, SSP - social performance, SSCM - sustainable supply chain management practices.

*Source: Field survey (2022)*

### **5.3.2 Multicollinearity**

To determine the extent of multicollinearity between the constructs/variables measured in the study, SPSS was used. “It is common to calculate multicollinearity using the volatility inflated factor (VIF) (Hair et al., 2010) to determine how closely one independent variable is connected to

another in a regression analysis. Latent variable scores of endogenous variables are used to determine the VIF values. These values between the measured constructs are analysed to uncover any multicollinearity problems before determining the path coefficients of the associations. For non-multicollinear independent variables, a VIF of less than or equal to 10 should be attained (Asher, 1983). Appendix B shows that the model's variables had VIFs ranging from 1.290 to 2.550, suggesting no indication of multicollinearity.

### **5.3.3 Test Of Model Fit Using Overall Fit And Other Measures**

This section assessed the model fit using overall fit and other measures, thereby using the coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), standardised root mean squared residual (SRMR) and the root mean square theta (RMS\_theta). Table 5.14 below depicts the measurement model's  $R^2$  and  $f^2$  to illustrate how well they all fit together.

Using this method, the equation's overall harmony is demonstrated. In statistics, the R-square (coefficient of determination) and effect size ( $f^2$ ) indicate how much of the variation in the dependent variable can be attributed to the independent variables.

The results of the model fit tests are shown in Table 5.14 below.

Table 5.14: Goodness-of-fit indices for the proposed model for the study

	<b>ECP</b>	<b>EP</b>	<b>IF</b>	<b>KF</b>	<b>MF</b>	<b>RF</b>	<b>SSP</b>	<b>SSCM</b>
<b>F square</b>								
ECP								
EP								
IF								0.121
KF								0.043
MF								0.036
RF								0.119
SSP								
SSCM	1.294	1.204					1.475	
<b>R square</b>	0.564	0.546					0.596	0.730
<b>R square adjusted</b>	0.563	0.545					0.595	0.726
<b>Model fit index</b>								
Standardised		0.075						
root mean square residual (SRMR)								
RMS_theta		0.101						

Variables: IF - instrumental factors, KF - knowledge factors, MF - moral factors, RF - relational factors, ECP - economic performance, EP - environmental performance, SSP - social performance, SSCM - sustainable supply chain management practices.

Source: Field survey (2022)

The “coefficient of determination ( $R^2$ ) measures the amount of variance in the endogenous variable that is explained by a set of exogenous variables in a model. This effect has a 0–1 scale, with 1 denoting perfect foresight. Scholars must depend on a "rough" rule of thumb for an acceptable  $R^2$  since it is adopted by several fields, with  $R^2$  values of 0.75, 0.50, and 0.25 defining substantial,

moderate, or poor levels of predictive accuracy, respectively (Hair et al., 2011; Henseler et al., 2009). Although  $R^2$  is a useful tool for measuring the quality of a PLS model, over-reliance on  $R^2$  might be dangerous. In particular, relying just on  $R^2$  may lead researchers to pick a less efficient model when comparing models with varying specifications of the same endogenous components (Hair et al., 2014).”

In Table 5.14 above, the total variance explained by the predictors of the ECP variable ( $R^2$ ) was 0.564. This implied that 56.4% of the variation in the ECP variable was explained by the SSCM variable and suggested moderate predictive accuracy. In addition, the total variance explained by the predictors of the EP variable ( $R^2$ ) was 0.546. This implied that 54.6% of the variation in the EP variable was explained by the SSCM variable and suggested moderate predictive accuracy. Again, the total variance explained by the predictors of the SSP variable ( $R^2$ ) was 0.596. This implied that 59.6% of the variation in the SSP variable was predicted by the by the SSCM variable and suggested moderate predictive accuracy. Finally, the total variance explained by the predictors of the SSCM variable ( $R^2$ ) was 0.730. This implied that 73% of the variation in the SSCM variable was predicted by the IF, KF, MF and RF variables, suggesting moderate predictive accuracy.

The effect size ( $f^2$ ) of “each exogenous construct to the endogenous constructs is shown in Table 5.14 above. Cohen (1988) proposes a guide to the interpretation of effect sizes. As a rule of thumb, values greater than 0.02, 0.15 and 0.35 are considered a small, medium and large effect, respectively.” As shown in Table 5.14 above, the effect of the IF variable on the SSCM variable had an  $f^2$  value of 0.121 representing a small effect size. Moreover, the effect of the KF variable on the SSCM variable had an  $f^2$  value of 0.043 representing a small effect size. The effect of the MF variable on the SSCM variable had an  $f^2$  value of 0.036 representing a small effect size. Finally,

the effect of the RF variable on the SSCM variable had an  $f^2$  value of 0.119, representing a large and small effect size, respectively.

The research evaluated the model fit indices, RMS\_theta and SRMR, in its final analysis. Lohmöller (1989) defines “RMS\_theta as the root mean squared covariance matrix of outer model residuals. This fit measure can only be used to evaluate completely reflecting models since outer” model residuals are useless in formative models. RMS\_theta is used to gauge the degree of similarity between the model's outer residuals. To show a good model fit, there should be very little connection between the outer model residuals (close to zero).

In Table 5.14 above, the RMS\_theta value was 0.101, which was less than the threshold value of less than 0.120. Unfit models have an RMS\_theta value more than 0.12, while well-fit models have a value less than 0.12. (Henseler et al., 2014). SMR “is defined as the difference between observed and predicted correlation matrices. Thus, the average difference in correlations observed and anticipated may be used as an absolute measure of the model fit. According to Hu and Bentler (1999), a value of less than or” equal to 0.10 or 0.08 is considered a good match (in a more cautious version). Model misspecification may be avoided by using Henseler et al.’s (2014) new goodness of fit measure for PLS-SEM, the SRMR. Table 5.14 shows an SRMR value of 0.075, which is within the acceptable range from 0.10 to 0.08.

#### **5.4 Normality test**

Even if “normally distributed data are not required for PLS-SEM analysis, desirable features such as the absence of severe outliers and collinearity must be guaranteed (Hair et al., 2019).” There is no assumption of randomness in PLS-SEM, at least not in most cases. However, Hair et al. (2018) emphasis that bootstrapping with non-normal data may result in bootstrap distributions that are



peaked and skewed. Thus, the distribution of the data was examined before using inferential statistics.

The two most frequent methods for establishing if a sample is normal are graphing and numerical techniques (including statistical tests). Statistical tests have the advantage of giving an objective assessment of normality, but they are insensitive to small sample sizes and oversensitive to large sample sizes. A skewness or kurtosis of +1.5 is deemed acceptable by Tabachnick and Fidell (2013). Data with a skewness or kurtosis higher than 3.0 are considered problematic by Kline (1998). If the skewness is unacceptable, data must be transferred, and outliers must be considered. When employing SEM, the predicted range for skewness is -3 to +3, while the expected range for kurtosis is -10 to +10 (Brown, 2015). Because SEM is a generally resilient analytical method, modest deviations may not signal major assumptions breaches if they fall outside of these boundaries. According to the table in Appendix C, the study's dataset has a normal distribution with an excess kurtosis ranging between 1 and 8.249 and skewness range between -2.304 and -1.085, which are acceptable according to Brown (2015).

## **5.5 Presentation of Results of the Inferential Statistical Analysis**

An examination of the path coefficients presented in Table 5.15 below revealed the effects amongst all the constructs were significant at a 5% significance level. The effect of the RF variable (H1) ( $\beta = 0.322$ ,  $STDEV = 0.075$ ,  $t\text{-statistic} = 4.300$ ) on the SSCM variable “was positive and significant with a p-value of 0.000. The prediction was further validated by the confidence level of 95% at the lower and upper boundaries of 0.193 and 0.434, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and significant.

The effect of the IF variable (H2) ( $\beta = 0.292$ ,  $STDEV = 0.091$ ,  $t\text{-statistic} = 3.216$ ) on the SSCM variable was “positive and significant with a p-value of 0.001. The prediction was further validated

by the confidence level of 95% at the lower and upper boundaries of 0.132 and 0.428, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and significant.”

The effect of the KF variable (H3) ( $\beta = 0.177$ , STDEV = 0.066, t-statistic = 2.674) on the SSCM variable “was positive and significant with a p-value of 0.008. The prediction was further validated by the confidence level of 95% at the lower and upper boundaries of 0.061 and 0.281, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and significant.”

The effect of the MF variable (H4) ( $\beta = 0.166$ , STDEV = 0.072, t-statistics = 2.292) on the SSCM variable was “positive and significant with a p-value of 0.022. The prediction was further validated by the confidence level of 95% at the lower and upper boundaries of 0.065 and 0.300, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and significant.

Table 5.15: Parameter estimates of the hypothesised paths

Effect	Path coefficient	Standard Deviation (STDEV)	T-statistic ( O/STDEV)	P-value	95% Confidence interval for $\beta$	
					Lower Bound	Upper Bound
Instrumental factors > Sustainable supply chain management practices	0.292	0.091	3.216	0.001	0.132	0.428
Knowledge factors -> Sustainable supply chain management practices	0.177	0.066	2.674	0.008	0.061	0.281
Moral factors > Sustainable supply chain management practices	0.166	0.072	2.292	0.022	0.065	0.300
Relational factors > Sustainable supply chain management practices	0.322	0.075	4.300	0.000	0.193	0.434
Sustainable supply chain management practices > Economical performance	0.751	0.081	9.244	0.000	0.603	0.865
Sustainable supply chain management practices > Environmental performance	0.739	0.065	11.432	0.000	0.628	0.838
Sustainable supply chain management practices > Social Performance	0.772	0.072	10.696	0.000	0.636	0.872

Source: Field survey (2022)

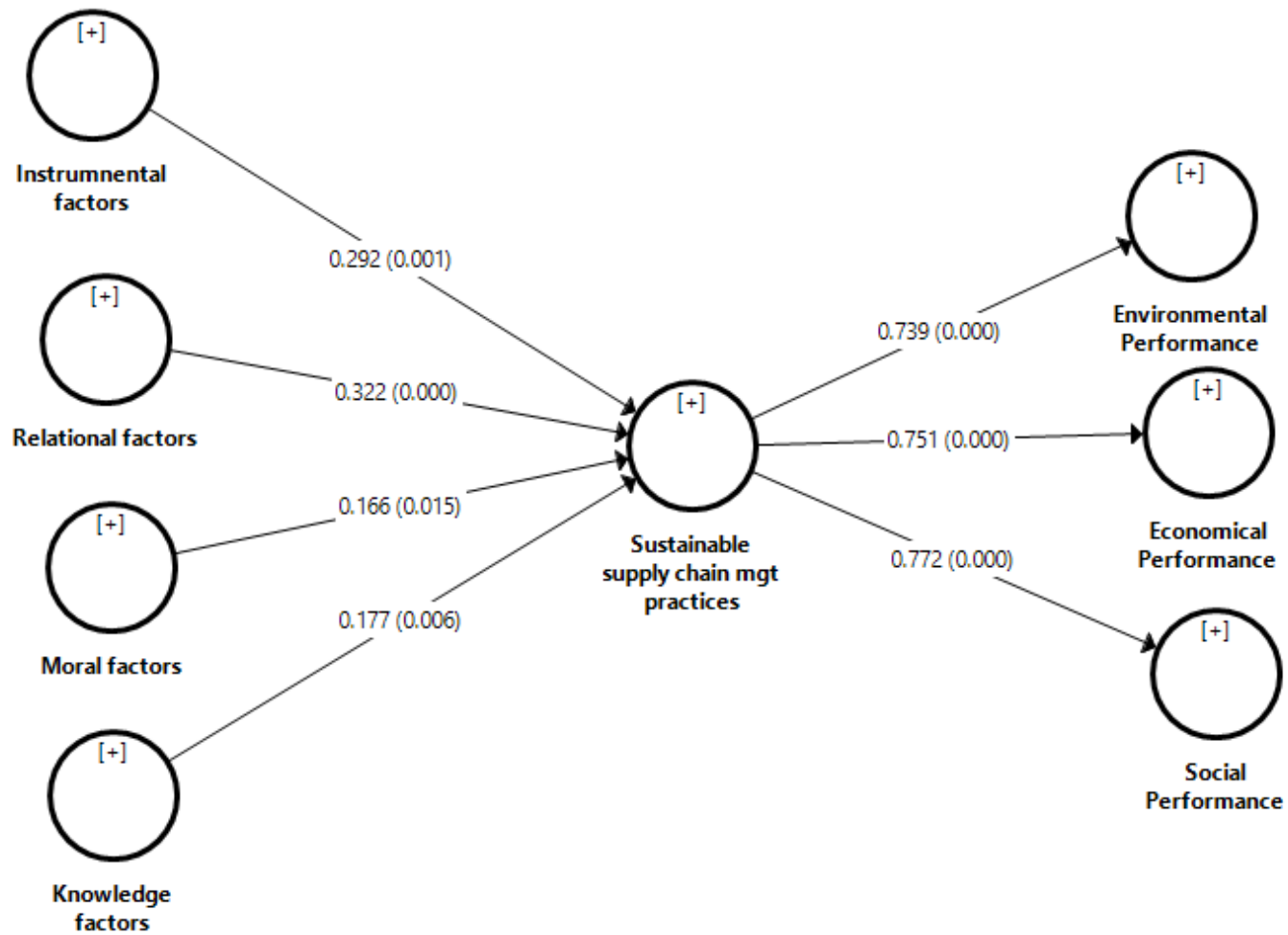


Figure 5.3: Main model of the study showing parameter estimates and significant values

Source: Field survey (2022)

The next task was to examine the effect of sustainable supply chain management on the performance of manufacturing firms in Ghana. It was revealed that sustainable supply chain management practices had a positive significant effect on economic performance (H5) ( $\beta = 0.751$ , STDEV = 0.081, t-statistic = 9.244) with a p-value of 0.000. The prediction was further validated by the confidence level of 95% at the lower and upper boundaries of 0.603 and 0.865, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and not spurious.”

Sustainable “supply chain management practices have a positive significant effect on environment performance (H6) ( $\beta = 0.739$ , STDEV = 0.065, t-statistic = 11.432) at p-value of 0.000. The prediction is further validated by the confidence level of 95% at the lower and upper boundaries of 0.628 and 0.838, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and significant.”

Sustainable supply chain management practices had a positive significant effect on social performance (H7) ( $\beta = 0.772$ , STDEV = 0.072, t-statistic = 10.696) at p-value of 0.000. The prediction was further validated by the confidence level of 95% at the lower and upper boundaries of 0.636 and 0.872, respectively. The unidimensionality of the confidence interval values indicated that the predictions were valid and not assumed.”

## **5.6 Correlation Analysis**

In this section, we discussed the connections between the many variables that were looked into. The Pearson correlation coefficient was utilised, along with a two-tailed test for significance, to

investigate the relationships between the factors that influence SSCM adoption and the SSCM practices amongst manufacturing firms in Ghana. In addition, the study assessed the relationship that exist between the SSCM practices and the performance (economic, social and environmental) of manufacturing firms in Ghana.

*Table 5.16: Relationship among the factors that influence SSCM adoption and the SSCM practices (Correlation matrix)*

	1	2	3	4	5	6	7	8
1 Instrumental factors	1							
2 Knowledge factors	0.650*	1						
3 Moral factors	0.701*	0.732*	1					
4 Relational factors	0.751*	0.741*	0.728*	1				
5 Demand-side sustainability collaboration	0.703*	0.678*	0.641*	0.723*	1			
6 Supply-side sustainability collaboration	0.725*	0.715*	0.686*	0.763*	0.816*	1		
7 Sustainable Product Design	0.709*	0.655*	0.682*	0.726*	0.792*	0.801*	1	
8 Sustainable process design	0.720*	0.669*	0.717*	0.745*	0.822*	0.786*	0.849*	1

\* Significant at 0.05

*Source: Field survey (2022)*

Table 5.16 shows the correlations among the factors that influence SSCM adoption and SSCM practices are positive and significant. Also, the coefficients of the various relationships suggest a strong relationship among the variables. The implication of the positive relationship is that an

improvement in the factors that influence SSCM adoption will improve SSCM practices. For example, instrumental factors had a positive and significant correlation with demand-side sustainability collaboration, supply-side sustainability collaboration, sustainable product design, and sustainable process design, with coefficient estimates of 0.703, 0.725, 0.709, and 0.720 ( $p < 0.5$ ), respectively, suggesting a strong relationship. Also, knowledge factors had a positive and significant relationship with demand-side sustainability collaboration, supply-side sustainability collaboration, sustainable product design, and sustainable process design, with correlation coefficients of 0.678, 0.715, 0.655, and 0.669 ( $p < 0.5$ ), respectively, suggesting a strong relationship. Again, moral factors had a positive and significant relationship with demand-side sustainability collaboration, supply-side sustainability collaboration, sustainable product design, and sustainable process design, with a correlation coefficient of 0.641, 0.686, 0.682, and 0.717 ( $p < 0.5$ ), respectively, suggesting a strong relationship. Finally, there was a positive and significant relationship between relational factors and the SSCM practices such as demand-side sustainability collaboration, supply-side sustainability collaboration, sustainable product design, and sustainable process design with a correlation coefficient of 0.723, 0.763, 0.726, and 0.745 ( $p < 0.5$ ) respectively. These results suggest that a strong relationship exists between relational factors and SSCM practices.

*Table 5.17: Relationship among the SSCM practices and firm performance (Correlation matrix)*

	1	2	3	4	5	6	7
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1 Demand-side sustainability collaboration	1						
2 Supply-side sustainability collaboration	0.816*	1					
3 Sustainable Product Design	0.792*	0.801*	1				
4 Sustainable process design	0.822*	0.786*	0.849*	1			
5 Economical Performance	0.691*	0.730*	0.680*	0.694*	1		
6 Environmental Performance	0.669*	0.707*	0.681*	0.678*	0.826*	1	
7 Social Performance	0.702*	0.751*	0.691*	0.722*	0.840*	0.818*	1

\* Significant at 0.05

Source: Field survey (2022)

Table 5.17 shows the correlations between the SSCM practices and firm performance (economic, social and environmental) are positive and significant. Also, the coefficients of the various relationships suggest a strong relationship among the variables. The positive relationship implies that an improvement in the SSCM practices will improve firm performance. For example, demand-side sustainability collaboration had a positive and significant correlation with economic, environmental and social performance, with coefficient estimates of 0.691, 0.669, 0.702 ( $p < 0.5$ ), respectively, suggesting a strong relationship. Also, supply-side sustainability collaboration had a positive and significant correlation with economic, environmental and social performance, with coefficient estimates of 0.730, 0.707, and 0.751 ( $p < 0.5$ ), respectively, suggesting a strong relationship. Again, sustainable product design had a positive and significant correlation with



economic, environmental and social performance, with coefficient estimates of 0.680, 0.681, and 0.691 ( $p < 0.5$ ), respectively, suggesting a strong relationship. Finally, there was a positive and significant relationship between Sustainable process design and the performance of manufacturing firms in the area of economic, environmental and social performance, with coefficient estimates of 0.694, 0.678, and 0.722 ( $p < 0.5$ ), respectively.

## **5.7 Presentation of the Findings of the Analysis of the Qualitative Data**

This study utilised a multimethod approach that combines quantitative and qualitative techniques. The objective of selecting this strategy was to eliminate the shortcomings of both alternatives. The purpose of this approach was to (1) identify the SSCM components that are significant in driving SSCM practices that impact firm performance socially, economically, and environmentally and (2) determine the links that define these configurations. It became important to conduct interviews with community members in order to have a deeper understanding of the correlations between the factors and practices of SSCM and how they influence firm performance. This allowed the researcher to gain a thorough understanding of SSCM practices and provided a foundation for the development of a future research agenda. The study began with quantitative analysis and qualitative interviews to acquire a deeper knowledge of SSCM (Venkatesh, Brown & Bala, 2013). Interviews were conducted with 20 community members in the areas where the selected manufacturing firms in the study were situated to ascertain their perceptions of their companies' SC activities. With the interview analysis, the study used Microsoft Excel to facilitate the logical understanding and presentation of the data collected in an organised fashion. The data gathered during the interview were subjected to thematic analysis. The study initially coded or categorised the data in the following: knowledge of manufacturing materials, materials and energy

consumption, recycling of materials and products, products, collaboration with the community in achieving sustainability goals, firms' image in the eyes of the community, and perceived space for improvement. However, on a close look at the first level one theme, the study further, categorised materials and energy consumption, recycling of materials and products, and products into the second and final level theme called "firms' attention to environmental and social concerns". The results are presented below.

### **5.7.1 Years Spent in the Area**

It was revealed that the minimum number of years that the interviewees had lived near the manufacturing firms was 2 years and the maximum was 17 years, with 8 years being the average number of years. This implies that they had a fair amount of knowledge about the manufacturing firms in their area. Almost (approximately 95%) of the interviewees maintained that they knew about the impact of the firms on the community.

### **5.7.2 Knowledge of Manufacturing Materials**

The interviewees indicated that they knew about the materials employed by the manufacturing firms in their daily activities, which included polysaccharides, polythene, chloride, sulphate, cow milk, fresh tomatoes, cellulose gel, water, cashew nuts, aryl amino alcohol compounds and fruit, such as mango, orange, coconut and pineapple.

### **5.7.3 Firms' Attention to Environmental and Social Concerns**

#### **5.7.4.1 Materials and Energy Consumption**

Almost all the interviewees (approximately 90%) maintained that the manufacturing firms pay attention to the effect of their activities on the environment and the people living in it (Figure 5.18). Some noted that this was because the community had insisted. One member residing in Sunyani stated the following about the firms' attempts to minimise the effect of their materials on the environment and the community:

*The manufacturing company pay attention to reducing material consumption because of the implication of the drugs they produce on their health and that of others, including residing community members. The drugs they produce when you inhale in large quantity can damage your health system; hence the company pay attention to material consumption and the amount of chemical they release to the environment.*

In Kumasi, another community member specifically mentioned how fossil fuel energy consumption impacts the environment and society:

*The manufacturing company pay attention to reducing energy or material consumption because the health of their consumers is their priority; hence much attention is paid to the material used. If much attention is not given to material consumption or reducing energy, their workers and the residing community members will be at risk.*

Figure 5.18: Community members' response

Community response	Rate of recurrence
<b>Years of residence</b>	
Minimum	2
Average	8
Maximum	17
<b>Firm pay attention to the environment</b>	
Yes	90%
No	10%
<b>Firm recycling of materials</b>	
Yes	60%
No	40%
<b>Firms collaborate with community</b>	
Yes	70%
No	30%
<b>Firms image outside</b>	
Good	90%
Poor	10%

Source: Field survey (2022)

#### 5.7.4.2 Recycling of Materials and Products

The interviewer asked whether the community members interviewed perceived the firms as reusing or recycling their materials and products. The majority (about 60%) of the interviewees said they believed that manufacturing reused and recycled products and materials. A resident of Accra stated as follows:

*After use, the oil containers and bottles are collected (by the company) from the consumers to be reused. At times, the residing community also collects the bottles themselves and sells them back to the company.*

However, some interviewees maintained that the manufacturing firms did not recycle or reuse materials or products because they were not suitable for this.

#### 5.7.4.3 Products

Some residents interviewed maintained that many of the products produced by the manufacturing firms in their area were environmentally friendly both in their use and waste. Interviews pointed out the environmental, economic and social effects of the products produced by the manufacturing firms. On the positive side, the community members stated that the manufacturing of products lead to job creation, which had social and economic benefits.

Some interviewees even saw the waste as a useful product produced by manufacturing firms if it could be used, for example, as a fertiliser or as food for animals, thereby having a social and economic benefit. On the negative side, interviewees that the chemicals used in the sachet packs and bottles do not decompose creating an environmental menace, some products are too sugary posing a threat to human health and product packaging pollutes the environment.

#### **5.7.4 Collaboration with the Community in Achieving Sustainability Goals.**

The interviewees noted that the manufacturing firms coordinated with them to achieve environmental, social and economic sustainability. A respondent from Kumasi stated, “*The firm discusses with customers on changes in packaging ... for products*”, which indicates that the company was aware of the community’s need for non-polluting packaging. Other interviewees mentioned that the manufacturing firms liaised with the community in terms of protecting the environment and society. In particular, an interviewee who lived close to a manufacturing company in Sunyani that produced products contained in sachets, remarked, “The manufacturing firms educate us on disposal of sachet water rubbers ... on how to discard used containers and bottles.

#### **5.7.5 Firms’ Image in The Eyes of The Community**

Community members were asked to rate the manufacturing firms in their area in terms of their sustainability initiatives. The companies were rated “good” by most of the interviewees because they used environmentally-friendly materials, created job opportunities, contributed to societal development, paid the tax, which furthered the interests of the community, and improved sanitation through recycling and the reuse of waste materials and products.

#### **5.7.6 Perceived Space for Improvement**

Interviewees identified ways for manufacturing firms to improve their promotion of environmental, social and economic sustainability. This included the development of processes to bring the firms closer to their customers, branding and packaging to attract higher market share and intensive education on how to recycle products, such as bottles used to package mineral water.

## 5.8 Summary of Hypotheses

The results of the hypothesis testing are summarised in table 5.19.

*Table 5.19: Summary of findings*

Hypothesis	Effect (Direct)	Path coefficient	P-value	Result
H1	Relational factors > Sustainable supply chain management practices	0.322	0.000	Supported
H2	Instrumental factors > Sustainable supply chain management practices	0.292	0.001	Supported
H3	Knowledge factors -> Sustainable supply chain management practices	0.177	0.008	Supported
H4	Moral factors > Sustainable supply chain management practices	0.166	0.022	Supported
H5	Sustainable supply chain management practices > Economical performance	0.751	0.000	Supported
H6	Sustainable supply chain management practices > Environmental performance	0.739	0.000	Supported
H7	Sustainable supply chain management practices > Social Performance	0.772	0.000	Supported

*Source: Field survey (2022)*

## **CHAPTER 6**

### **DISCUSSION OF OUTCOMES**

#### **6.1 Introduction**

The results and findings of the quantitative and qualitative data analyses, respectively, were linked to the four research objectives in Chapter 6. The outcomes are discussed in this chapter in light of the hypotheses that were formulated after the research questions and objectives. In addition, the outcomes are linked to other fields of study and compared with the results and findings of previous studies. Again, the insight deduced from the interviews is used to support the quantitative analysis findings.

#### **6.2 Relational factors and SSCM practices**

The first hypothesis of the study was that relational factors “have a positive effect on a firm’s SSCM practices. The results of the inferential statistical analysis of the quantitative data revealed that relational factors have a positive and significant effect on a firm’s SSCM practices, which means that the hypothesis is accepted. This outcome is in line with the results of the studies conducted by Vasileiou and Morris (2006), Markley and Davis (2007), Carter and Rogers (2008), Awaysheh and Klassen (2010) and Golini et al. (2014).”

In the measurement model, relational factors were identified as the need for a firm to distinguish itself from its competitors, multiply its customer base, have sustainability regulations for staff, make clients aware of its green initiatives and maintain a competitive advantage. According to Vasileiou and Morris (2006), all SC players are concerned about the economic and commercial issues that affect their ability to remain in business and maintain a competitive edge, which is why they adopt SSCM practices. In addition, cooperation with suppliers in promoting environmental, social and economic sustainability mitigates uncertainty and risk.



Markley and Davis (2007), in their study, point out that the competitive advantage is a factor influencing firms to adopt SSCM practices. It can, therefore, be inferred those relational factors have a significant effect on SSCM practices. Awaysheh and Klassen's (2010) study implies that socially responsible practices should be regulated, although Colicchia et al. (2011) posit that some firms voluntarily practise SSCM to gain a competitive advantage in the market.

### **6.3 Instrumental factors and SSCM practices**

The second hypothesis was that instrumental factors “have a positive effect on a firm’s SSCM practices. The results of the inferential statistical analysis of the quantitative data revealed that instrumental factors have a positive and significant effect on a firm’s SSCM practices, which means that the hypothesis is accepted. This outcome is consistent with the results of the studies” conducted by Hamprecht et al., (2005); Vasileiou and Morris (2006) and Carter and Rogers (2008). In the measurement model, instrumental factors were identified as a firm’s need to prevent poor publicity, meet the demands from stakeholders concerning sustainability, satisfy the shareholders and to ensure short- and long-term profitability. These factors represent pressure from the public, stakeholders and shareholders and the economic pillar of the TBL, which is profit, as opposed to the social and environmental pillars (people and the planet). This has been discussed in detail by Laosirihongthong et al. (2020), Gold et al. (2013) and Khokhar et al. (2022). According to Vasileiou and Morris (2006), firms feel the need to implement SSCM practices when they are concerned about their industry's declining profitability and a growing level of financial uncertainty.

### **6.4 Knowledge Factors and SSCM Practices**

The third hypothesis was that knowledge factors have a positive effect on a firm’s SSCM practices. The “results of the inferential statistical analysis of the quantitative data revealed that knowledge

factors have a positive and significant effect on a firm's SSCM practices, which means that the hypothesis is accepted. This outcome is consistent with the results of the study conducted by Islam et al. (2020) who found that SSCM implementation in Bangladesh's leather and footwear industries was inhibited by a lack of knowledge and expertise, which had a significant impact on other challenges.

In the measurement model, knowledge factors were identified as the availability of information, training and education; and health and safety. Therefore, the study results suggest that a firm would implement SSCM practices if its managers were informed, trained and educated about the benefits, especially the health and safety of the environment and society. However, if these factors were ignored, then the environmental, social and economic performance of a company would be inadequate.

## **6.5 Moral Factors and SSCM Practices**

The fourth hypothesis was that moral factors “have a positive effect on a firm's SSCM practices. The results of the inferential statistical analysis of the quantitative data revealed that moral factors have a positive and significant effect on a firm's SSCM practices, which means that the hypothesis is accepted. This outcome is consistent with the results of the study conducted by Islam et al. (2020) who found that SSCM” implementation in Bangladesh's leather and footwear industries was inhibited by noncompliance with the principles of social and environmental responsibility. This lack of adherence to doing what is right, led to large international customers no longer placing orders.

In the measurement model, moral factors were identified as the need to do what is right, genuine concern about the environment, a sense of responsibility for the environment and compliance with a corporate strategy of environmental responsiveness. Thus, moral factors are principles of right

and wrong compelling manufacturing firms to promote sustainability in the SC. Therefore, sustainability is no longer an option and is an ethical priority and requirement infusing the SC (Khan et al., 2018). Suppliers, investors, customers and other stakeholders would agree on the rectitude of SSCM practices and put pressure on a firm to adopt them.

## **6.6 SSCM Practices and Economic Performance**

The fifth hypothesis was that a firm's SSCM practices positively influence its economic performance. The results of the inferential statistical analysis of the quantitative data revealed that a firm's SSCM practices positively and significantly influence its economic performance, which means that the hypothesis is accepted. The study's findings pertaining to SSCM practices and economic performance corroborated with what the interviewees said about the manufacturing company's product and its impact on the economy. The interviewees were of the specific opinion that manufacturing goods bring about an increase in employment opportunities. The outcome is also consistent with the results of the studies conducted by Kaufmann and Carter (2010), Mefford (2011), Hamprecht et al. (2005) and Vasileiou and Morris (2006).

In the measurement model, economic performance was identified as the cost reduction of purchased materials and energy use, fee reduction "for waste discharge, improvement in earnings per share, return on investment and" growth of sales and profit. These elements of economic performance reflect the business knowledge and capabilities that Hamprecht et al. (2005) assert are part of economic performance due to SSCM practices that are appropriately controlled.

Kaufmann and Carter, (2010) in their study, found that firms that promote sustainability do better in their overall economic performance. Carter and Rogers (2008) posit that firms strategically undertaking SSCM practices will perform better economically than firms that do not pursue the TBL.

## **6.7 SSCM Practices and Environmental Performance**

The sixth hypothesis was “that a firm’s SSCM practices positively influence its environmental performance. The results of the inferential statistical analysis of the quantitative data revealed that” a firm’s SSCM practices positively and significantly influence its environment performance, which means that the hypothesis is accepted. What the interviewees said about the manufacturing company's product and its impact on the environment was consistent with the study's findings concerning SSCM practises and environmental performance. The interviewees backed up claims of a major effect on the environment. The interviewees' discussions of the impact on the environment centred on the negative aspects. They highlighted the environmental menace, the danger that sugary foods pose to human health, and the environmental impact of product packaging.

This outcome is consistent with the results of the studies conducted by Vasileiou and Morris (2006) and Kaufmann and Carter (2010). According to Golini et al. (2014), to achieve outstanding environmental performance, a firm needs to embrace environmentally-friendly technology and practices. Using a conceptual model, Wang and Dai (2018) in their study of Chinese firms found that SSCM practices had a significant impact on the environmental performance.

In the measurement model, environmental performance was identified as the improvement to a firm’s environmental situation; waste and air pollution reduction; the reduction of the consumptions of toxic/harmful materials; the reduction of environmental accidents; and the reduction of the use of natural resources.

## **6.8 SSCM Practices and Social Performance**

The seventh hypothesis was that a firm’s SSCM practices positively influence its social performance. The results of the inferential statistical analysis of the quantitative data revealed that

a firm's SSCM practices positively and significantly influence its social, which means that the hypothesis is accepted. Interviewees' accounts of the manufacturing firm's product and its effect on societal collaboration were consistent with the study's findings regarding SSCM practices and social performance. Societal collaboration is interpreted as a form of social performance. Interviewees believed that businesses communicate with the public about environmental and social concerns, including changes to product packaging.

This result is in line with those of Kaufmann and Carter (2010), Mefford (2011), Vasileiou & Morris 2006 and Golini et al. (2012). Kaufmann and Carter, 2010 study found that social and environmental sustainability drives the long-term profitability of firms in developing countries gives, which is a motivation for companies to focus on social and environmental concerns. Golini et al.'s (2014) study found that that SSCM practices have a considerable effect on the social “performance of manufacturing firms. Wang and Dai (2018) in their study also found a link between SSCM practices and the social performance of Chinese firm as well as a significant relationship between social and economic” performance.

In the measurement model, social performance was customer satisfaction improvement; the improvement of a company's image and reputation in the eyes of a customers; increased investment in social projects; the improvement of relations with community stakeholders, e.g., community activists and NGOs; better employee education and training; improved employee health and safety; and attention to stakeholder betterment and welfare.

## **6.9 The factors that influence SSCM Adoption and SSCM Practices**

The study assessed the relationship between the factors that influence SSCM adoption and SSCM practices amongst manufacturing firms in Ghana. The results of the correlation analysis of the quantitative data revealed that the correlations among the factors that influence SSCM adoption

and SSCM practices were all positive and significant. The positive association implies that an improvement in the factors that influence the adoption of SSCM will improve SSCM practises. The studies theories (contingency theory, resource-based view, relational-view theory, innovation diffusion theory, stakeholder theory, and resource dependence theory) provide a useful framework for understanding the relationship between the factors that influence SSCM adoption and SSCM practices.

For example, the contingency theory (Donaldson, 2001) suggests that organisations that are better prepared to embrace SSCM practices will be more successful at implementing them in the context of SSCM adoption. This is corroborated by the findings of this study, which demonstrate a favourable correlation between SSCM adoption variables and SSCM practices. SSCM techniques are more likely to be successfully implemented by businesses that can connect their organisational characteristics with their requirements.

#### **6.10 The SSCM Practices and Firm Performance**

The study assessed the relationship between SSCM practices and firm performance among manufacturing firms in Ghana. The results of the correlation analysis of the quantitative data revealed that the correlations between SSCM practices and firm performance were all positive and significant. These findings are consistent with previous research that has found similar positive relationships between SSCM practices and firm performance (e.g., Pagell & Wu, 2009; Zhu et al., 2013; Kumar, Singh & Modgil, 2020). However, Das (2018) result indicated otherwise. The results suggest that firms adopting SSCM practices may experience enhanced performance outcomes and improved stakeholder relationships. The study's findings also support several theoretical perspectives, including contingency theory, the resource-based view, the relational-view theory, innovation diffusion theory, stakeholder theory, and resource dependence theory.

Contingency theory suggests that SSCM practises' effectiveness depends on their context, which helps explain this relationship. The study found that corporate strategy alignment was a major barrier to SSCM adoption, indicating that firms must carefully consider their internal context when implementing SSCM practises. The resource-based view shows how SSCM practises affecting firm performance. This theory states that a firm's resources and capabilities determine its performance. SSCM practises can improve a firm's resources and capabilities, particularly in environmental and social responsibility, which may improve performance (Carter & Rogers, 2008).

According to the relational-view theory, a firm's stakeholders, such as suppliers and customers, can affect its performance. SSCM practises involve supplier and supply chain collaboration and communication, making this theory relevant. Supplier monitoring and risk management were major challenges for firms implementing SSCM practises, highlighting the importance of strong supplier relationships for SSCM success. Innovation diffusion theory illuminates SSCM practises and firm performance. According to this theory, social norms, networks, and perceived benefits and risks of innovation influence adoption. The study found a positive relationship between SSCM practises and firm performance, suggesting that firms increasingly recognise the benefits of sustainable practices and are influenced by social norms and networks that promote them.

Finally, stakeholder and resource dependence theories illuminate how SSCM practices affect firm performance. Both theories emphasise the importance of stakeholders' needs and interests, including suppliers, customers, and communities, in achieving sustainable performance outcomes. SSCM practices may improve stakeholder relations and resource access for socially responsible firms (Seuring & Muller, 2008).

### **6.11 Barriers to the adoption of SSCM by Manufacturing firms**

The fourth objective was to investigate the barriers to the adoption of SSCM by manufacturing firms in Ghana. The participants in the study strongly agreed that there are challenges and inhibiting factors that hinder the adoption of SSCM practices. The study categorized the barriers into two groups, challenging factors and inhibiting factors. The study identified challenges to corporate culture, transparency of knowledge and information, capital investment commitments, alignment of corporate strategy with SSCM initiatives, measurement, and supplier monitoring and risk management. These factors hinder SSCM adoption in Ghanaian manufacturing firms. Corporate culture may make organisations reluctant to adopt sustainable practices because it deviates from standard business practices (Owusu, 2019). Transparency requires companies to share sensitive data, which could hurt their competitiveness. Capital investment commitments are difficult because sustainable practises can be expensive, especially for small and medium-sized enterprises (SMEs) (Linton et al., 2007; Abbasi & Nilsson, 2012). Corporate strategy's alignment with SSCM initiatives determines how much companies value sustainability.

The study identified supply chain loyalty and commitment, insufficient funds and technology, inadequate experienced personnel, infrastructural issues, competition, and inadequate research and development as inhibiting factors. Ghanaian manufacturing firms struggle to adopt SSCM practices, making sustainable practices difficult. Insufficient funds and technology prevent firms from investing in sustainable technologies and processes, and infrastructural issues affect supply chain efficiency. Supply chain loyalty and competition also affect organisations' ability to collaborate on sustainability initiatives. Insufficient research and development funding limit the availability of information and resources for sustainable practices (Tanco et al., 2015).



## **CHAPTER 7**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **7.1 Introduction**

This “chapter summarises the study by referring to the research problem; the research objectives; the numerous relationships investigated; the research design and methodology, data processing and analysis, the research theories; and the models employed. In particular, the significance of the study's findings in terms of the research objectives and conclusions are summarised in this chapter. The study’s implications for practice are also discussed in this chapter, along with the study's limitations and recommendations for future research.”

#### **7.2 Summary of the study**

The main objective of the research was to investigate whether SSCM practices have been adopted by manufacturing firms in Ghana. If they have been adopted, the question is how are they implemented? If they have not been adopted, what is the reason for their absence, and how are companies operating? The researcher sought to find out how well manufacturing firms adopt SSCM practices, what goes into that adoption and how the adoption of SSCM practices benefit their economic, social and environmental performance. The study sought to investigate whether the design and application of SSCM practices or policies bring about the enhancement of the fiscal performance of Ghanaian manufacturing firms and make them environmentally and socially responsible. The following are the specific objectives that guided this study:

1. To evaluate the SSCM practices of manufacturing firms in Ghana
2. To examine the factors that influence the adoption of SSCM practices of manufacturing firms in Ghana.
3. To investigate the impact of SSCM on the performance of manufacturing firms in Ghana

4. To assess the barriers to the adoption of SSCM among the manufacturing firms in Ghana

The research was initiated because of the decreasing or struggling performance of manufacturing firms in developing nations, Ghana included. The manufacturing industry in Ghana faces a lot of sustainability issues, which inadvertently affect its growth. Even though SSCM practice and theory have been developing quickly, several businesses including manufacturing firms are still seeking the best ways to integrate and apply sustainability practices into their supply chain. However, there is a significant gap in the research on SSCM practices in emerging nations such as Ghana, as research on SSCM is mostly conducted in advanced nations.

The study investigated the SSCM practices of selected manufacturing companies in Ghana. Developing strategies that promote SSCM can assist in promoting growth in the struggling manufacturing business in Ghana. In addition, the study was guided by six theories, which included the contingency theory, the RBV, the RVT, the innovation diffusion theory, the stakeholder theory and the RDT.

This research adopted a descriptive and inferential design because it would be effective in studying the SSCM practices of manufacturing firms in Ghana. The mixed-methods research approach was employed to gather data from the respondents. Quantitative data were collected through questionnaires from the procurement officers, accountants and CEOs of 1900 selected manufacturing firms, and qualitative data were gathered through interviews with community members residing near the manufacturing firms. The study sites in Ghana were Kumasi, Accra/Tema, Sunyani and Takoradi, where most manufacturing activities take place.

The purposive “sampling method was used to select the manufacturing firms and staff participating in the study. The sample size calculated for the study was 320. A structured closed-ended questionnaires and semi-structured interviews were the data collection instruments employed to

collect data from respondents. A questionnaire was used because it was able to reach a lot of people and was easily analysed. Five-point Likert scale questions made up the questionnaire. Semi-structures interviews allowed the researcher to probe further into the responses” provided by the interviewees.

Respondents’ informed consent was requested, and confidentiality was assured. The study was limited to manufacturing firms and not companies in other sectors. There were 350 questionnaires handed “out, and 303 questionnaires were completed and returned, which was a response rate of 87% and thus was sufficient for statistical analysis. Descriptive statistics were generated using IBM SPSS version 26, and the inferential statistics were computed using SmartPLS 3. Table 7.1 below summarises the results of the analysis of the quantitative data combined with the findings of the qualitative data analysis.”

*Table 7.1: Summary of the results and findings of the study*

<b>Research Objective</b>	<b>Results/Findings</b>
<p><b>Research Objective 1:</b> To evaluate the SSCM practices among manufacturing firms in Ghana</p>	<p>Four SSCM practices were evaluated: “sustainable product design, sustainable process design, supply-side sustainability collaboration and demand-side sustainability collaboration.” The outcome was that manufacturing firms in Ghana have adopted SSCM practices.</p>
<p><b>Research Objective 2 :</b> To examine the factors that influence the adoption of SSCM practices by manufacturing firms in Ghana</p>	<p>Four variables influenced the adoption of SSCM practices namely: relational, instrumental, moral and knowledge factors. After data analysis, all four factors were found to influence the adoption of SSCM practices by manufacturing firms in Ghana</p>
<p><b>Research Objective 3:</b> To investigate the impact of SSCM on the performance of manufacturing firms in Ghana</p>	<p>It was revealed after data analysis that SSCM practices have a positive and significant effect on the economic, environmental and social performance of manufacturing firms in Ghana</p>
<p><b>Research Objective 4:</b> To assess the barriers to the adoption of SSCM amongst the manufacturing firms in Ghana</p>	<p>The participants in the study strongly agreed that there are challenges and inhibiting factors that hinder the adoption of SSCM practices. These challenges are corporate culture, transparency of knowledge and information, capital investment commitments, alignment of corporate strategy with SSCM initiatives, measurement, and supplier monitoring and risk management. Also, the inhibiting factors are supply chain loyalty and commitment, insufficient funds and technology, inadequate</p>

Research Objective	Results/Findings
	experienced personnel, infrastructural issues, competition, and inadequate research and development.

*Source: Author's construct (2022)*

## 7.2 Conclusions

Based on the study outcomes presented and discussed in Chapters 5 and 6, the study concluded that instrumental, relational, moral and knowledge factors affected the adoption of SSCM practices by firms in Ghana.

Therefore, manufacturing firms adopt SSCM practices to do the following: prevent poor publicity, maintain a good image, satisfy shareholders, achieve long-term profitability, stand out amongst their competitors, multiply their customer base, comply with sustainability regulations, gain a sustained competitive advantage, do what is right, show their genuine concern for the environment, comply with a corporate strategy of environmental responsiveness and respond to continuously increasing information.

The study found that the adoption of SSCM practices has a significant impact on manufacturing firms' performance in achieving environment sustainability goals by doing the following: using environmentally friendly materials in product design, standardising product design to facilitate reuse, manufacturing environmentally-friendly products, evaluating existing processes to minimise their impact on the environment, formalising environmentally-friendly processes, teaming up with their clients and suppliers to attain sustainability goals, carrying out mutual planning with their suppliers and customers to anticipate and solve sustainability problems, collaborating with clients to provide services and/or products that comply with sustainability

objectives, reducing waste and air pollution, minimising the use of toxic/harmful materials, preventing environmental accidents, reducing the use of natural resources.

The study found that the adoption of SSCM practices has a significant impact on manufacturing firms' performance in achieving social responsibility goals by doing the following: forming relationships with community stakeholders, e.g., community activists and NGOs, employee education and training, employees' occupational safety and health, stakeholder betterment and welfare.

The study found that the adoption of SSCM practices has a significant impact on manufacturing firms' performance in achieving financial goals by doing the following: reducing the cost of materials by recycling, reducing energy use, minimising the cost of waste discharge by using biodegradable materials, improving customer satisfaction, thereby increasing sales, profits and return on investments, and improving a firm's image and reputation, thereby increasing earnings per share.

### **7.3 Implication for practice**

The implications of the study outcomes are that more Ghanaian manufacturing firms might adopt SSCM practices, especially those listed in the previous section, to improve their contribution to environmental sustainability and the betterment of society and achieve economic objectives. Several lessons can be drawn from this study to help managers improve the SSCM performance of their manufacturing firms. First, they must prioritise adopting SSCM practices to improve their organisations' performance. This involves employing sustainable sourcing, eco-design, energy efficiency, waste reduction, and sustainable logistics practices. Managers must secondly align their corporate strategies with SSCM initiatives to ensure that sustainability is incorporated into the overall business strategy.

Thirdly, managers must invest in the necessary resources to support the implementation and maintenance of SSCM practises, including funds, technology, and skilled personnel. This includes providing employees with ongoing training on sustainability issues and forming partnerships with suppliers to increase supply chain transparency and promote sustainability. Fourthly, managers must regularly monitor and assess their SSCM practises to determine their efficacy and identify areas for improvement. This includes establishing lucid sustainability objectives, developing performance indicators, and communicating progress to stakeholders. Managers should engage in stakeholder management in order to foster positive relationships with stakeholders, such as customers, suppliers, employees, and the local community. This includes communicating the company's sustainability efforts and involving stakeholders in decision-making processes in order to increase their engagement and commitment to sustainability.

In summary, this study emphasises the significance of SSCM practises in enhancing firm performance and provides valuable lessons for managers to support the SSCM performance of their manufacturing firms. Managers can improve their firms' sustainability performance and contribute to the overall sustainability of the manufacturing industry by prioritising the adoption of SSCM practices, aligning corporate strategies with sustainability, investing in resources, monitoring and measuring practices, and engaging in stakeholder management.

#### **7.4 Implications for research and policy**

This study emphasis the significance of policy intervention to support the adoption and implementation of SSCM practises by Ghanaian manufacturing firms. Government policies could provide tax exemptions, grants, and subsidies to encourage the adoption of SSCM practises by businesses. This could assist in mitigating a number of the financial obstacles identified in the study. Second, the study emphasises the need for companies to adopt a long-term perspective of

SSCM practises and align them with their overall corporate strategy. This is consistent with the resource-based view theory, which posits that a company's resources and capabilities should be aligned with its overall strategy in order to achieve a competitive advantage.

In addition, this study emphasises the significance of stakeholder participation in SSCM practises. Managers must recognise the importance of involving their suppliers, customers, and other stakeholders in their SSCM practises. This is consistent with the stakeholder theory, which suggests that a company's decision-making process should take into account the interests of its stakeholders. In addition, this study highlights the significance of continuous SSCM practise improvement. According to the theory of innovation diffusion, businesses must continuously seek to improve their practises and adopt new technologies in order to remain competitive. Therefore, managers should endeavour to continuously incorporate new and emerging SSCM practises into their operations.

This study has several implications for future research and policy intervention to support the adoption and implementation of sustainable supply chain management practises by Ghanaian manufacturing firms. It emphasises the need for additional research, policy intervention, a long-term perspective, stakeholder participation, and continuous improvement of SSCM practises.

### **7.5 Limitation to the study**

The current study has some limitations that must be noted. Firstly, the cross-sectional design of this study hinders our capacity to make causal inferences regarding the associations between SSCM practices and company performance. To demonstrate the causal linkages between SSCM practices and company performance over time, future study should investigate using a longitudinal research methodology.



Although this study used a mixed method approach, the study over depended on self-reported data, raising issues regarding social desirability bias. Respondents may have supplied socially desired answers, which may have affected the study's conclusions. A future study might include alternate data sources, such as supplier records or third-party audits, to confirm the self-reported data.

The sample size is an additional limitation of this study. The study was performed among a small sample of Ghanaian manufacturing enterprises, which restricts the generalizability of the results to the larger population of manufacturing firms in Ghana. To increase the generalisability of the findings, future research may employ a bigger sample size and a more representative sample. In addition, future research might adopt a multi-level view by investigating the involvement of other stakeholders, including suppliers, customers, and regulatory agencies, in influencing SSCM practices and their influence on company performance.

Future research might evaluate the role of contextual variables, such as cultural variations and institutional contexts, on the adoption and efficacy of SSCM techniques by performing comparative studies across different nations or regions. This would enable a more sophisticated understanding of the factors that drive SSCM practices and their influence on company performance in a variety of scenarios.

## **7.6 Recommendations for future research**

On the basis of the current study's findings and limitations, the study makes the following recommendations for future research in terms of theory, methodology, and research context. Firstly, the study highlights the need for further research to be conducted to understand the barriers to adoption of SSCM practices by manufacturing firms in Ghana. The findings of this study

provide a starting point for researchers to build upon, but additional studies with larger sample sizes and more diverse firms should be conducted to confirm the results.

Again, future research could build on this study by investigating additional theoretical perspectives better to comprehend the relationship between SSCM practices and firm performance. Specifically, future research could investigate the relationship between institutional theory and institutional environment and SSCM practices and firm performance. This may result in a deeper understanding of the social and cultural factors that influence the adoption and implementation of SSCM practices in various contexts. In addition, future research could investigate the impact of firm size, industry, and national context on the association between SSCM practices and firm performance. This could further our understanding of the contexts in which SSCM practices are most effective and the factors that influence their adoption and implementation.

Also, future research could examine the moderating effects of organisational size, industry type, and supply chain structure on the association between SSCM practices and firm performance. This would provide a more nuanced understanding of the factors that impact the efficacy of SSCM practices in various settings. Moreover, researchers can extend this study by employing a longitudinal research design to monitor the evolution and implementation of SSCM practices over time. This would allow for the identification of factors that facilitate or impede the adoption and sustainability of SSCM practices, as well as the measurement of the long-term impact of SSCM practices on firm performance.

Furthermore, future research can investigate the connection between SSCM practices and various dimensions of firm performance, including financial, social, and environmental performance. This would facilitate the development of more targeted SSCM strategies and provide a more comprehensive understanding of the impact of SSCM practices on various aspects of firm

performance. Also, scholars can investigate the influence of suppliers, customers, and regulators on the implementation and adoption of SSCM practices. This would shed light on the intricate interdependencies between stakeholders and how they affect the efficacy of SSCM practices. Finally, future research can examine the barriers to the adoption of SSCM practices in other developing nations to compare and contrast with Ghanaian manufacturing firms. This would enhance the generalizability of the findings and facilitate the development of more context-specific SSCM strategies.

In conclusion, future research can employ qualitative methods such as case studies and ethnography to better understand the complexities and nuances of SSCM practices in various settings. In addition, future research may employ additional data collection techniques, such as interviews and focus groups, to capture the perspectives and experiences of various stakeholders. This study contributes to the literature on SSCM practices in developing countries by identifying the barriers to adoption and the positive association between SSCM practices and firm performance. Future research can build on this study by examining the moderating effects of contextual factors, examining the role of various stakeholders, and employing other research methods to gain a deeper understanding of SSCM practices.

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## Appendix A1: Questionnaires

### SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES AMONGST MANUFACTURING FIRMS IN GHANA

#### DEMOGRAPHIC INFORMATION

1. Type of manufacturing: textiles [  ]; non- metallic products [  ] chemicals and chemical products [  ] paper and paper products [  ] food and beverages [  ]
2. Position: chief executive officer [  ] accountant [  ] procurement officer [  ]
3. Firms existence (years): [  ]
4. Location/Region: Ashanti Region[  ]; Greater Accra[  ]; Bono Region [  ]; Western Region [  ]
5. Ownership: solely Ghanaian owned [  ]; foreign owned; [  ]; joint ventureship [  ]  
Average annual income (\$): 1000000-2000000 [  ]; 2000000-3000000 [  ] 3000000-4000000 [  ]; 4000000-5000000 [  ]; above 5000000 [  ]  
Legal form of entity: not registered [  ]; sole proprietorship [  ]; limited liability [  ]; public limited liability [  ]; partnership [  ]; other specify [.....]

## OBJECTIVE ONE

### **Sustainable supply chain management practices amongst manufacturing firms in Ghana**

6. On the five-point Likert scale ranging from ‘Strongly Disagree (1)’ to ‘Strongly Agree (5)’, indicate the extent to which you agree with the following statements on sustainable supply chain management practices in your firm.

**\*NOTE:** 5 = Strongly Agree (SA); 4 = Agree (A); 3 = Neutral (N); 2 = Disagree (D); and 1 = Strongly Disagree (SD)

<b>Practices</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Sustainable product design</b>					
SD01	Care is taken to reduce energy/material consumption				
SD02	Attention is paid to reuse, recycle and/or recover of material				
SD03	Products are designed to use environmentally-friendly materials				
SD04	Products are design with standardised elements to facilitate reuse				
SD05	Products are designed for easy disassembly				
SD06	Life cycle analysis is used to evaluate the environmental impacts of our products				
SD07	There are formal procedures for environmental product design				
<b>Sustainable process design</b>					
SP01	Our processes are greatly reliant on sustainability goals				
SP02	Our existing processes are evaluated to minimise their impact on the environment				
SP03	There is a formal environmental guiding principle for process design				

SP04 Our processes are reengineered to minimise their environmental impact

SP05 We enhance the environmental friendliness of our production

**Supply-side sustainability collaboration**

SSC01 We team up with our suppliers to attain sustainability goals

SSC02 We provide our suppliers with what they need to ensure the attainment of sustainability goals

SSC03 We team up with our suppliers to provide services and/or products that support our sustainability objectives

SSC04 We develop a mutual understanding of tasks with our suppliers concerning sustainability performance

SSC05 We carry out mutual planning with our suppliers to anticipate and solve problems related to sustainability

SSC06 We at times provide suppliers with feedback on their sustainability performance

**Demand-side sustainability collaboration**

DSC01 We liaise with our clients to attain sustainability goals

DSC02 We liaise with our clients to enhance their sustainability initiatives

DSC03 We team up with our clients to provide services and/or products that back our sustainability objectives

DSC04 We develop a common understanding of tasks with our clients concerning sustainability performance

DSC05 We carry out mutual planning with our customers to anticipate and solve problems related to sustainability

**OBJECTIVE TWO**

The factors that influence the adoption of sustainable supply chain management practice amongst manufacturing firms in Ghana

On the five-point Likert scale ranging from ‘Strongly Disagree (1)’ to ‘Strongly Agree (5)’, indicate the extent to which you agree with the following statements on factors that influence the adoption of sustainable supply chain management practice in your firm.

**\*NOTE:** 5 = Strongly Agree (SA), 4 = Agree (A), 3 = Neutral (N), 2 = Disagree (D), and 1 = Strongly Disagree (SD)

<b>Factors</b>	<b>Description</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	<b>Instrumental factors</b>					
IF01	To prevent poor publicity					
IF02	Shareholders demand for sustainability improvements					
IF03	To satisfy our shareholders					
IF04	To get short-term profitability					
IF05	For long-term profitability					
	<b>Relational factors</b>					
RF01	To distinguish our firm from our competitors					

- RF02 To multiply our customer base
- RF03 Sustainability regulation
- RF04 Clients awareness to green Initiatives
- RF05 Community pressure
- RF06 Source of sustained competitive advantage

**Moral factors**

- MF01 As it is the correct thing to do
- MF02 Due to genuine concern for the environment
- MF03 Because we feel responsibility to the environment
- MF04 As top management deems environmental responsiveness as a crucial element of corporate Strategy

**Knowledge factors**

- KF01 Information availability



- KF02 Training and education
- KF03 Health and safety

**OBJECTIVE THREE**

**The impact of sustainable supply chain management on the performance  
of manufacturing firms in Ghana**

On the five-point Likert scale ranging from ‘Strongly Disagree (1)’ to ‘Strongly Agree (5)’, indicate the extent to which you agree with the following statements on impact of sustainable supply chain management on performance in your firm.

**\*NOTE:** 5 = Strongly Agree (SA), 4 = Agree (A), 3 = Neutral (N), 2 = Disagree (D), and 1 = Strongly Disagree (SD)

**Performance** **1 2 3 4 5**

**Environmental performance**

- EP01 Improvement of a firm’s environmental situation
- EP02 Waste reduction
- EP03 Air pollution reduction
- EP04 Reduction of consumption for toxic/harmful materials
- EP05 Reduction of environmental accidents frequency
- EP06 Reduction in natural resources use

**Economic performance**

- EcP01 Cost reduction of purchased materials
- EcP02 Cost reduction of energy use

- EcP03 Fee reduction for waste discharge
- EcP04 Improvement in earnings per share
- EcP05 Improvement in return on investment
- EcP06 Growth of sales
- EcP07 Growth of profits

### **Social performance**

- SP01 Customer satisfaction improvement
- SP02 Improvement of firm's image in the customers eyes
- SP03 Investments improvement on social projects (sports, culture, education)
- SP04 Improvement in relations with community stakeholders, e.g., community activists and nongovernmental organizations
- SP05 Improvement in employee education and training
- SP06 Improvement in employees occupational safety and health
- SP07 Improvement in stakeholder betterment or welfare

## OBJECTIVE FOUR

### **The barriers to the adoption of sustainable supply chain management amongst the manufacturing firms in Ghana.**

On the five-point Likert scale ranging from ‘Strongly Disagree (1)’ to ‘Strongly Agree (5)’, indicate the extent to which you agree with the following statements on barriers to the adoption of SSCM in your firm.

**\*NOTE:** 5 = Strongly Agree (SA), 4 = Agree (A), 3 = Neutral (N), 2 = Disagree (D), and 1 = Strongly Disagree (SD)

**1 2 3 4 5**

### **Challenges**

- C01 Corporate culture
- C02 Transparency of knowledge and information
- C03 Capital investment commitments
- C04 Alignment of corporate strategy with SSCM initiatives
- C05 Measurement
- C06 Supplier monitoring and risk management

### **Inhabiting Factors**

- InF01 Loyalty and commitment levels within the chain
- InF02 inadequacy of funds and technology
- InF03 inadequate experienced personnel
- InF04 Infrastructural problems
- InF05 Competition

**A2: QUESTIONNAIRE/GUIDE FOR COMMUNITY MEMBERS INTERVIEWED  
ABOUT THEIR PERCEPTIONS OF THE SUSTAINABLE SUPPLY CHAIN  
ACTIVITIES  
OF THE FIRMS IN THEIR AREA**

How long have you stayed in this community? .....

1. How long have you known this nearby manufacturing firm? .....
2. What does it produce? .....
3. Have you purchased product from them before? A. Yes B. No

If yes, how often do you buy from them?.....

4. What materials are used in their production? .....
5. Do they pay attention to reduce energy or material consumption A. Yes B. No

Explain your answer: .....

.....  
.....  
.....

6. Do they reuse or recycle their materials? A. Yes B. No

Explain your answer: .....

.....  
.....  
.....

7. Are their products environmentally friendly? A. Yes B. No

8. Does supply chain management of their products have an effect on the environment?

A. Yes    B. No

If yes state them

i.     Positive effects: .....

.....

.....

.....

ii.    Negative effects: .....

.....

.....

.....

9. Does supply chain management of their products have effect on the society?

A. Yes    B. No

If yes state them

i.     Positive effects: .....

.....

.....

.....

ii.    Negative effects: .....

.....

.....

.....

10. Does supply chain management of their products have effect on the economy?

A. Yes    B. No

If yes state them

i. Positive effects: .....  
.....  
.....

ii. Negative effects: .....  
.....  
.....

11. Does the firm coordinate with you (customers) on their sustainability issues?

A. Yes B. No

*If yes, how:* .....  
.....  
.....

12. Does the firm communicate to you (customers) on issues of recycle and reuse

A. Yes B. No

*If yes, how:* .....  
.....  
.....

13. Does the firm liaise with you (customers) to enhance your (customers) sustainability initiatives

A. Yes B. No

*If yes, how:* .....  
.....  
.....

14. Does the firm liaise with you (customers) to provide services and/or products that back their sustainability objectives      A. Yes      B. No

*If yes, how:* .....  
.....  
.....

15. Does the firm develop a common understanding of tasks with you (customers) concerning sustainability performance      A. Yes      B. No

*If yes, how:* .....  
.....  
.....

16. Does the firm carry out mutual planning with you (customers) to anticipate and solve problems related to sustainability      A. Yes      B. No

*If yes, how:* .....  
.....  
.....

17. How will you rate the firms' image in terms of their sustainable management?

i.      *Environment:* A. Very good    B. Good    C. Not sure    D. Bad    E. Very bad

Explain your answer: .....  
.....

ii.      *Society:* A. Very good    B. Good    C. Not sure    D. Bad    E. Very bad

Explain your answer: .....  
.....

iii.      *Economy:* A. Very good    B. Good    C. Not sure    D. Bad    E. Very bad

Explain your answer: .....

.....

18. Does the firm supply chain activities influence your attitude towards the firm

A. Yes    B. No

*Explain your answer:* .....

.....

.....

.....

19. In your view, what can the firm do to improve their supply chain sustainability management? .....

.....

.....

.....

.....



## Appendix B: Variance Inflation Factor

Indicator	VIF
DSC01	2.193
DSC02	2.020
DSC03	2.138
DSC04	2.106
DSC05	2.193
ECP01	1.763
ECP02	1.701
ECP03	1.591
ECP04	1.806
ECP05	1.911
ECP06	1.773
ECP07	2.089
EP01	1.790
EP02	1.675
EP03	1.961
EP04	2.114
EP05	2.030
EP06	1.363
IF01	1.290
IF02	1.294

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Indicator	VIF
IF03	1.525
IF05	1.430
KF01	1.579
KF02	1.580
KF03	1.667
MF01	1.442
MF02	1.856
MF03	1.878
MF04	1.714
RF01	1.471
RF02	1.578
RF03	1.388
RF04	1.547
RF06	1.574
SD03	1.929
SD04	2.332
SD05	2.006
SD06	2.170
SD07	2.390
SP01	2.157
SP02	2.072
SP03	2.244

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Indicator	VIF
SP04	2.144
SP05	2.183
SSC01	2.286
SSC02	2.119
SSC04	2.035
SSC05	2.180
SSC06	2.005
SSP01	2.151
SSP02	2.080
SSP03	1.981
SSP04	1.940
SSP05	2.302
SSP06	2.145
SGSP07	2.550

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*Source: Field survey (2022)*

### Appendix C: Normality Test – Kurtosis and Skewness

Indicator	Excess Kurtosis	Skewness
SDO1	3.97	-1.534
SD02	4.203	-1.646
SD03	3.942	-1.702
SD04	5.518	-2.101
SD05	3.58	-1.645
SD06	3.662	-1.601
SD07	3.876	-1.624
SP01	3.278	-1.5
SP02	4.571	-1.751
SP03	5.42	-1.904
SP04	5.044	-1.79
SP05	4.268	-1.805
SSC01	5.586	-1.893
SSC02	4.4	-1.772
SSC03	1.469	-1.085
SSC04	3.572	-1.633
SSC05	4.996	-1.806
SSC06	1.927	-1.318
DSC01	6.075	-1.892
DSC02	4.234	-1.701
DSC03	4.886	-1.643

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Indicator	Excess Kurtosis	Skewness
DSC04	3.241	-1.533
DSC05	1	-1.137
IF01	6.102	-1.915
IF02	2.483	-1.351
IF03	5.271	-1.854
IF04	3.743	-1.844
IF05	6.216	-1.801
RF01	4.932	-1.704
RF02	2.908	-1.359
RF03	5.036	-1.694
RF04	3.975	-1.613
RF05	3.736	-1.664
RF06	1.226	-1.099
MF01	4.037	-1.635
MF02	5.108	-1.766
MF03	5.8	-1.949
MF04	2.217	-1.38
KF01	2.134	-1.315
KF02	6.919	-2.014
KF03	7.429	-2.304
EP01	8.249	-2.258
EP02	3.921	-1.601

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Indicator	Excess Kurtosis	Skewness
EP03	4.123	-1.709
EP04	4.636	-1.915
EP05	6.29	-2.056
EP06	4.324	-1.845
ECP01	3.239	-1.529
ECP02	2.764	-1.457
ECP03	3.923	-1.636
ECP04	5.784	-1.9
ECP05	4.159	-1.635
ECP06	7.194	-2.156
ECP07	5.234	-1.94
SSP01	4.528	-1.79
SSP02	6.754	-2.163
SSP03	3.468	-1.509
SSP04	1.291	-1.21
SSP05	2.604	-1.425
SSP06	7.367	-2.131
SSP07	7.26	-2.157
C01	6.112	-2.215
C02	5.35	-1.953
C03	4.946	-1.91
C04	3.684	-1.611

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Indicator	Excess Kurtosis	Skewness
C05	3.528	-1.585
C06	6.36	-2.137
INF01	4.196	-1.758
INF02	3.801	-1.785
INF03	3.785	-1.658
INF04	4.181	-1.906
INF05	5.437	-2.051
INF06	5.534	-2.253

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*Source: Field survey (2022)*

## Appendix D: Ethical Clearance



05 May 2021

**Mr Johnson Nsowah (219096340)**  
**School Of Man Info Tech & Gov**  
**Westville Campus**

Dear Mr Nsowah,

**Protocol reference number:** HSSREC/00002575/2021

**Project title:** The assessment of sustainable supply chain management practices among selected manufacturing firms in Ghana

**Degree:** PhD

### Approval Notification – Expedited Application

This letter serves to notify you that your application received on 09 March 2021 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

**Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.**

This approval is valid until 05 May 2022.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

**All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.**

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,



**Professor Dipane Hlalele (Chair)**

/dd

### Humanities and Social Sciences Research Ethics Committee

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