THE EFFECT OF FIRM-LEVEL FACTORS ON SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE OUTCOMES IN THE OIL AND GAS INDUSTRY

by

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Declaration

Type of Award: Doctor of Philosophy

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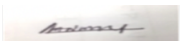
Signature of Candidate: 

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ABSTRACT

The concept of sustainable supply chain management (SSCM) has gained increasing attention in both practice and theory in the last two decades thus, stimulating serious academic discourse, especially on its implementation as a way of minimizing the negative effects of industrial activities on the environment. Although SSCM practices have been implemented by oil and gas companies during this period, it is unclear whether these initiatives are undertaken because they are profitable or due to the regulations compelling them. Several new debates have opened in recent times regarding whether the implementation of sustainability practices really pays, and therefore the performance outcomes of SSCM remain open to question. Similarly, earlier research on sustainability practices in the oil and gas industry has paid less attention to firm-level factors that either promote or hamper development towards achieving a sustainable supply chain.

This study investigates the effect of organisational factors (corporate culture, organisational size, and quality of management) on SSCM implementation in the oil and gas supply chain. Secondly, the study investigates whether the implementation of sustainability practices contributes to organisational performance. Thirdly, the study investigates the extent to which firm-level factors affect the performance outcomes of SSCM. In doing so, a questionnaire survey of 192 oil and gas corporations was conducted, and the collected data was analysed using correlation analysis, multiple regression analysis, and structural equation modelling technique. Furthermore, a comprehensive review of extant literature on SSCM in various industrial contexts was carried out.

The main findings from this study reveal that the implementation of SSCM practices is driven by corporate culture, organisational size, and quality of management. It was also observed that strong corporate culture and quality of management are positively related to firm performance. Notably, the most important contribution of this study relates to the finding of a significant positive association between SSCM adoption and business performance, which clears the ambiguities about the consequences of SSCM implementation. Lastly, the result from this study highlights the significance of corporate culture and quality of management in determining how SSCM is implemented within firms and the derivable benefits, which helps explain the differences in performance outcomes attained by companies implementing the same SSCM practices.

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Chapter 1: Introduction

1.1 Introduction

This chapter presents the background and context of this study, the research aim, objectives and questions, the methodology adopted and a brief justification of the chosen method, the research significance, the thesis's structure including the key points discussed in every chapter, as well as a brief conclusion of the chapter.

1.2 Background

Supply chain, if properly managed, can be a significant driver of competitiveness in the continuously changing business environment, which is characterized by intense competition (Lambert and Enz, 2017). Today, business focus has shifted from individual entities to managing complicated supply chains (Piercy, 2009). Supply chain management (SCM) is considered as an effective means of synchronizing and integrating internal and external organisational processes. However, the end-to-end activities involved in SCM has triggered increasing environmental concerns regarding pollution, waste, emissions, and excessive use of natural resources (Carter and Rogers, 2008; Giunipero et al., 2008). SCM activities often affects the natural environment, as it comprises different business processes, ranging from sourcing to production and distribution of products (Handfield and Steininger, 2005). Nowadays, many organisations are part of at least one or multiple supply chains, and the way in which these organisations manage their supply chains can reduce negative environmental impacts (Seuring and Müller, 2008; Ashby et al., 2012; Dai et al., 2021).

In the last two decades, increasing environmental problems coupled with scarcity of raw materials have forced governments, customers, and shareholders to request for a more responsible production activities (Esfahbodi et al., 2016). In response to such pressures from various stakeholders, manufacturing firms are striving towards minimizing negative environmental impacts and making their conventional supply chains more friendly to the environment (Linton et

al., 2007; Ahi and Searcy, 2015). Consequently, the traditional supply chain in recent years has advanced significantly, incorporating sustainability approach and moved towards becoming a sustainable supply chain so as to promote the production of environmentally friendly products and services (Pagell and Wu, 2009; Paulraj et al., 2017). The inclusion of sustainability strategies in the supply chain context to address pressing environmental issues (Seuring and Müller, 2008; Tseng et al., 2015) have produced the multi-disciplinary field of sustainable supply chain management (SSCM).

Since its inception, SSCM has received considerable attention in the academia and has become one of the leading topics of discussion in operations and SCM literature (Sarkis et al., 2011; Hong et al., 2022). This rapid popularity of SSCM concept, however, is not limited to the academia. In the industrial sector, many organisations have recognised the importance of SSCM, as the demand for effective management of environmental impacts intensifies (Carter and Easton, 2011; Lintukangas et al., 2015). Increasing attention on environmental responsibilities have forced organisations especially in the manufacturing sector, to implement various SSCM initiatives in their supply chains, providing socially and environmentally responsible services and products (Su et al., 2021; Tsai et al., 2021) that have minimum impact on the environment. While much of the literature acknowledged that firms' adoption of SSCM initiatives along their supply chains is mostly in response to the regulations put in place by policy makers (Walker and Jones, 2008; Zhu et al., 2008; Yang et al., 2015), recent studies reveal that regulations are required, but however, they are not enough in SSCM adoption (Ahmad et al., 2016; Paulraj et al., 2017; Dai et al., 2021; Hong et al., 2022). These studies argue that the external driving forces imposing regulations can only promote the implementation of SSCM practices to a certain extent, requesting the organisation's internal commitment and encouragement.

From a holistic perspective, a number of external forces related to regulations and the firm's internal commitment exerts great influence on SSCM implementation (Walker and Jones, 2012; Ahmad et al., 2017). Firms engaging in reactive SSCM practices only strive towards regulatory compliance, whereas those engaged in proactive sustainable practices are willing to go beyond regulatory compliance to address environmental and social concerns (Torugsa et al., 2012; Mukhsin and Suryanto, 2022). Researchers have argued that proactive approach towards SSCM, which is mainly internally driven lead to enhanced corporate image and ultimately provides a competitive edge (Luthra et al., 2016; Hong et al., 2022). Even though this study acknowledges

the effects of external factors on SSCM implementation, it mainly focuses on the internal enablers that encourage companies to implement sustainable practices. In other words, instead of explaining the forces that pressurize firms to be sustainable in their operations, the current study seeks to clarify the benefits that firms could achieve through SSCM. Extant literature on SSCM (Luthra et al., 2016; Paulraj et al., 2017; Raut et al., 2017; Wan Ahmad et al., 2017; Gardas et al., 2019; Tsai et al., 2021; Tseng et al., 2022) mainly focuses on factors that influence its adoption, often disregarding how the performance outcomes derivable from its adoption interrelate with organisational characteristics, constituting a knowledge gap.

Despite the growing demands for environmentally friendly production, organisations must take into consideration the impact of implementing sustainable practices not just on their performance in the environmental bottom line, but also on the financial bottom line (Zhu et al., 2007). This is because economic performance is generally the main priority for organisations (Schaltegger and Burritt, 2014). In that regard, a number of scholars found that SSCM implementation can offer 'win-win' solutions, providing environmental protection, social equity, and financial gains (Yang et al., 2011; Wagner, 2015; Esfahbodi et al., 2016). Although the 'win-win' argument of achieving improvements in environmental, social, financial performance simultaneously has promoted the implementation of SSCM, the 'win-win' opportunity has not been the case in all previous empirical studies (Zhu et al., 2007; Parast and Adams, 2012; Mukhsin and Suryanto, 2022; Sanchez-Flores et al., 2022).

On one hand, the implementation of sustainability practices is anticipated to lessen the degree of pollution, waste and emissions, which as a result, improves companys's environmental performance. On the other hand, it is expected that the adoption of sustainability practices can provide cost savings and better corporate image, improving the firm's economic bottom line (Vachon and Klassen, 2006; Wagner, 2015). The consensus in the literature is that SSCM adoption can improve environmental, social, and economic bottom lines (Laosirihongthong et al., 2013; Sinaga et al., 2019), until novel findings surfaced creating doubt on the initial consensus.

While numerous studies on the connection between the adoption of sustainability practices and corporate performance have reported positive effects (Wagner and Blom, 2011; Gyula, 2013; Yusuf et al., 2013; Esfahbodi et al., 2016; Paulraj et al., 2017), others identified opposite results (Mahoney and Roberts, 2007; Parast and Adams, 2012; Sanchez-Flores et al., 2022).

Consequently, new debates have begun in recent times questioning whether the application of sustainable practices will eventually produce greater organisational performance (Habib et al., 2021; Khan et al., 2021). In this respect, researchers have questioned the current literature on whether the incorporation of SSCM practices in industrial supply chains really pays (Marcus and Fremeth, 2009; Clarkson et al., 2011; Dixon-Fowler et al., 2013; Mukhsin and Suryanto, 2022). Therefore, the effects of SSCM initiatives on the performance of organisations remains a subject of debate that creates a need for the clarification of the ambiguity surrounding the connection between SSCM and firm performance in the literature. Hence, the research problems of the current study are centred on whether the application of SSCM practices within the oil and gas supply chain contributes to the performance of firms.

1.3 Research Context

The oil and gas sector is vital to economic and social activities, as it provides the required products to sustain universal energy demand (Lakhal et al., 2007). However, the industry has considerably negative effects on the ecosystem and its inhabitants. It is considered to be the leading polluting industries across the globe (Hussain, 2006; Yusuf et al., 2013). In light of this, stakeholders are mounting pressure on oil and gas enterprises to operate in a more responsible manner in order to protect the natural environment (Matos and Hall, 2007). The adoption of SSCM in the sector is not only aimed at achieving socially and environmentally responsible activities, but rather, to assist the sector to adapt to the consistently changing business environment effectively (Wan Ahmad et al., 2017).

Over the years, demand for oil and gas products is rising and its supply declining, thereby affecting other commodities prices. Increases in oil prices often influence the price of other commodities (Slaibi, 2011; Schmidt, 2015), which creates a need for regulating product price in the sector. SSCM initiatives can help address several economic, social, and ecological concerns in the petroleum industry (Lakhal et al., 2007; Olugu et al., 2022). Despite this, the operations and SCM literature has overlooked the oil and gas sector (Hussain, 2006; Gardas et al., 2019). Currently, there are few studies on SSCM in the sector.

Lakhal et al. (2007) carried out the earliest research in the petroleum industry, introducing the "Olympic" green notion that seeks to reduce emissions and waste. Their later study applied the Olympic notion in pinpointing the financial, social, and environmental disparities and ineffective resource consumption in the industry (Lakhal et al., 2009). Midttun et al. (2007) studied the barriers to corporate social responsibility (CSR) implementation within the offshore petroleum sector. Deng and Liu (2011) put forward a conceptual model for the operationalization of green supply chain management (GSCM) in the Chinese oil and gas sector. Nevertheless, GSCM studies have been criticized for focusing only on the environmental aspect of sustainability. Otherstudies are about closed-loop GSCM (Min and Galle, 2001; Zhu et al., 2007; Zhu et al., 2008; Matos and Hall, 2007; Stindt and Sahamie, 2014), CSR (Hartman et al., 2007; Zutshi et al., 2009; Du and Vieira, 2012), and the implementation of sustainability practices and business performance in the industry (Yusuf et al., 2013). Recent studies focused on the factors that affect SSCM implementation in the sector (Ahmad et al., 2016; George et al., 2016; Wan Ahmad et al., 2017; Raut et al., 2017; Gardas et al., 2019; Beiranvand and Dorniani, 2022; Olugu et al., 2022).

However, majority of these studies are highly fragmented, because they mainly focused on the external pressures and regulations that force firms to implement SSCM practices, often neglecting complex organisational factors that determine how SSCM is implemented in firms, and how the performance outcomes derivable from its adoption interrelate with organisational characteristics (Wan Ahmad et al., 2016; Gardas et al., 2019; Beiranvand and Dorniani, 2022; Olugu et al., 2022). The dearth of studies creates a need for research on SSCM in the industry in order to enhance our understanding on the extent to which the industry's internal environment can either promote or hamper development towards SSCM implementation. Therefore, there is a need for a conceptual model that takes into consideration measurable organisational characteristics and performance outcomes of SSCM implementation. For instance, it is essential to examine the extent to which the adoption of SSCM is affected by factors such as business size, organisational culture, and quality of management. The extents to which these factors affect SSCM adoption and benefits derivable from SSCM investments in the oil and gas sector have not been investigated extensively in the existing literature.

In this study, the researcher argues that even though significant research has been conducted on SSCM in different sectors, mixed findings were reported concerning the links between SSCM implementation and the resulting performance benefits. The current study seeks to address the

ambiguity in extant literature and contribute to the ongoing debate on whether financial, social, and environmental performance can be realised simultaneously by implementing sustainability practices (Gardas et al., 2019; Su et al., 2021; Zehender et al., 2021) within the O&G industry context. Thus, as emphasised in the previous paragraph, there is a need for greater insight into the effects of internal factors on the SSCM adoption, and how the performance outcomes derivable from its implementation interact with organisational characteristics. The following section (1.4) highlights the research aim and objectives.

1.4 Research Aim and Objectives

This study aims to examine the effects of organisational factors (corporate culture, business size, and quality of management) on SSCM implementation in the O&G supply chain. Secondly, the study investigates whether SSCM implementation contributes to organisational performance. Thirdly, the study investigates the extent to which organisational factors affect the performance outcomes of SSCM practices. This research is different from previous studies in that it seeks to clarify the benefits that firms could achieve through implementing internally driven SSCM practices. Majority of the previous studies have focused mainly on the external factors, such as government regulations and competitive pressures that force firms to implement SSCM practices, often neglecting the internal factors that motivate firms to engage in proactive SSCM strategies. Accordingly, in order to realise the purpose of this research, five objectives were formulated:

- To identify the influence of organisational culture, business size, and quality of management on the implementation of SSCM practices in the O&G supply chain.
- To examine the effects of organisational culture and quality of management on firm performance in the O&G supply chain.
- To investigate the relationships between the implementation of SSCM practices and firm performance in the O&G supply chain.
- To assess the extent to which organisational factors influence the performance outcomes derived from SSCM implementation in the O&G supply chain.

- To empirically examine an internally driven SSCM practices-performance model in the O&G supply chain.

1.5 Research Questions

The abovementioned objectives were framed into the following research questions:

- What are the effects of organisational culture, business size, and quality of management on the implementation of SSCM practices in the O&G supply chain?
- What are the effects of organisational culture and quality of management on firm performance in the O&G supply chain?
- What effect does the implementation of SSCM practices have on firm performance in the O&G supply chain?
- Does SSCM practices mediate the relationship between organisational factors (culture and QOM) and firm performance in the O&G supply chain?

1.6 Research Methodology

This study begins by formulating research aim, objectives and questions from existing literature (Easterby-Smith et al., 2015; Sekaran and Bougie, 2016). The study adopts a quantitative research method because it comprises of quantifiable attributes. Primarily, the aim of quantitative research is to test hypothesis and verify theories by examining the research questions, and demonstrating the link between theory and research (Neuman, 2012). Survey by questionnaire seems to be the most appropriate for quantitative research (Forza, 2002; Saunders et al., 2015). Therefore, survey by questionnaire was adopted in collecting quantifiable information from oil and gas corporations operating in the UK and Nigeria. The questionnaire was initially tested through a pilot study and the outcomes were used in reviewing the questionnaire. Thereafter, the revised questionnaire was used in undertaking the main study. In doing so, both postal and online questionnaires were used in order to increase the response rate (Edwards et al., 2009). The main stages of the study's design are depicted in figure 1.1.

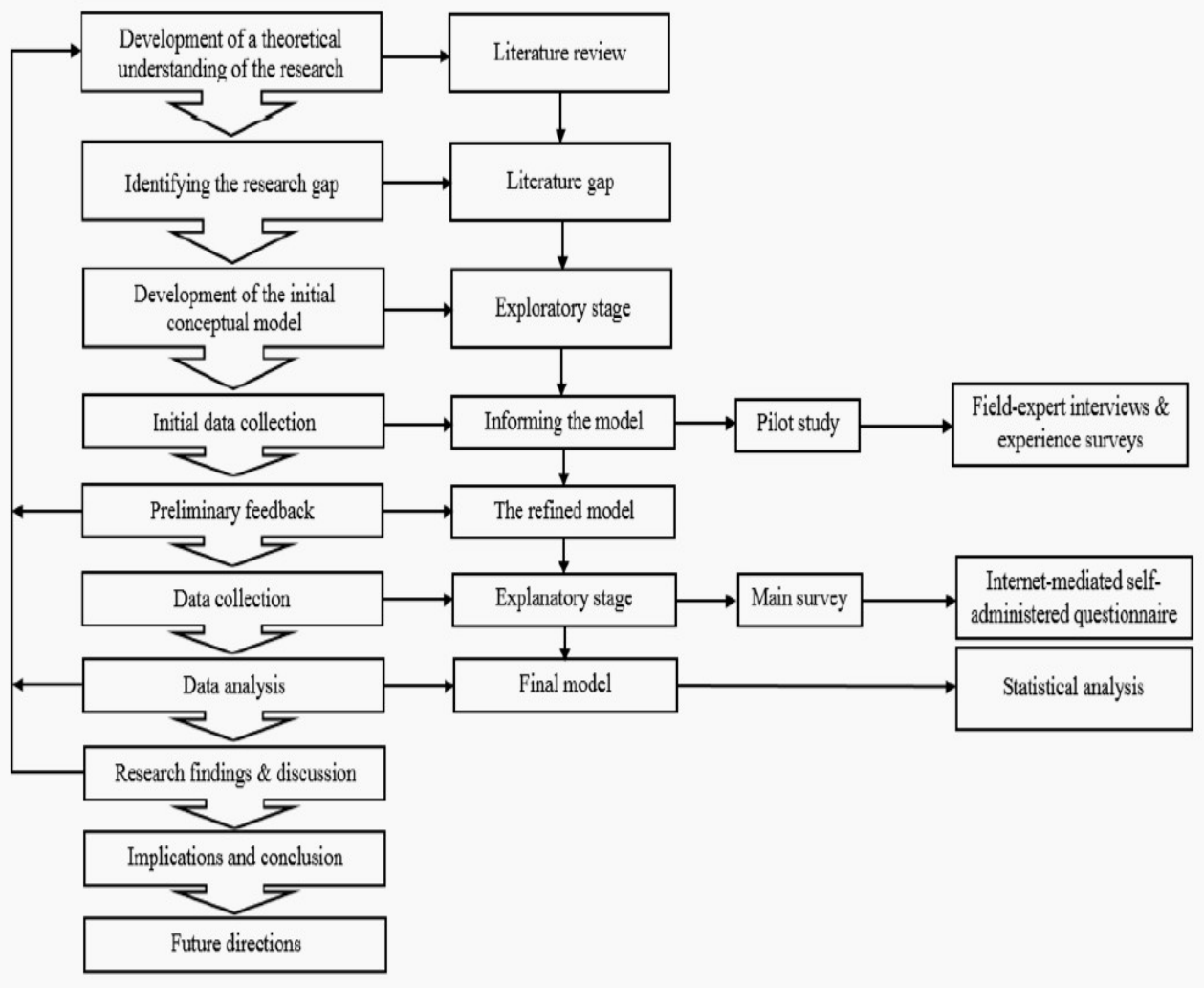

Figure 1. 1 Research design.

1.7 Research Significance

The aim of this research is to contribute towards the advancement of the current literature on SSCM in the oil and gas industry. While the industry is crucial to both economic and social development, its end-to-end activities are very harmful to the environmental and public health and safety (Ahmad et al., 2017; Beiranvand and Dorniani, 2022; Olugu et al., 2022). SSCM in the industry is, therefore, an important strategy that must be considered by the industry's key players so that the risks involved are minimised or eliminated. Hence, regulatory agencies, end users and other

stakeholders are compelling oil and gas corporations to reduce the negative effects of their operations on the environment (Azadeh et al., 2015; Olugu et al., 2022) through the incorporation of sustainability approach in their supply chains. SSCM implementation in the sector can improve the effectiveness of exploration, production, distribution, and minimize oil spills, flaring, and accidents, as well as boost financial strength of the firms (Gardas et al., 2019; Olugu et al., 2022). However, the Deepwater Horizon accident that occurred in 2010 has exposed the lack of effective SSCM strategy regarding environmental, health and safety protection within the industry (Lin-Hi and Blumberg, 2011; George et al., 2016). Hence, there is a need to investigate the extent to which SSCM practices in the sector contribute to the environmental, social, financial, and operational performance of oil and gas firms.

Thus, the purpose of this research is to contribute to the existing literature on SSCM, particularly with regard to its impacts on firm performance. Numerous studies on the links between SSCM adoption and firm performance have been conducted in different industrial sectors with mixed findings. While some found positive impacts (Wagner and Blom, 2011; Gyula, 2013; Esfahbodi et al., 2016; Paulraj et al., 2017; Mukhsin and Suryanto, 2022), others identified opposite results (Mahoney and Roberts, 2007; Parast and Adams, 2012; Habib et al., 2021). Thus, it is contended that there is much confusion in the literature concerning the impacts of SSCM implementation on the performance of organisations. This ambiguity in the literature necessitates further empirical investigation. The current study seeks to bridge the ambiguity and contribute to the ongoing arguments on whether financial, social, environmental, and operational performance can be realised simultaneously by implementing sustainability practices (Luthra et al., 2015, 2016; Beiranvand and Dorniani, 2022) in the O&G sector.

On the other hand, earlier studies on SSCM in the O&G sector are very fragmented. They centred on the external pressures and regulations that force firms to implement SSCM practices, often neglecting complex organisational factors that define how SSCM is implemented in firms, and the extent to which benefits derivable from SSCM adoption interrelate with organisational factors (Wan Ahmad et al., 2016; Gardas et al., 2019; Beiranvand and Dorniani, 2022; Olugu et al., 2022). In view of this, the current study contributes significantly to the growing field of SSCM through assessing the adoption of sustainable practices within supply chains as well as its resultant effect on firm performance outcomes. More so, the study also examined the interactions between internal organisational factors and the performance benefits of SSCM in the oil and gas sector.

1.8 Outline of the thesis

There are seven chapters in this thesis comprising the following: Chapter 1 presents the background and context of the study. It provides a summary of the area to be examined, highlighting the aims, objectives and questions of the research. Chapter 2 reviews extant literature on SSCM, including the factors that influence its adoption and the benefits derivable from its implementation. It also discusses the organisational theories used in explaining firms' adoption of SSCM practices. Chapter 3 introduces the conceptual model and its components. Chapter 4 presents and justifies the chosen research methodology. Chapter 5 presents the results of the survey, which was obtained from the statistical analysis. Chapter 6 discusses the findings on the relationships between organisational factors (corporate culture, business size, and quality of management), SSCM implementation, and firm performance. Chapter 7 concludes the thesis by pinpointing the recommendations and managerial implications from the study. The structure of the thesis is illustrated in figure 1.2.

1.9 Summary

This chapter has presented the background and context of the study. The aim, objectives and questions of the research have been specified. In addition, the gaps identified in the literature, which necessitates the study, have been highlighted. Furthermore, the research methodology employed in this research has equally been introduced and justified. Lastly, this chapter has shown the thesis's outline, including the key points discussed in every chapter. The next chapter reviews the literature on the evolution of SSCM, internal drivers of SSCM, benefits of implementing SSCM, and the organisational theories used in explaining company's implementation of SSCM practices.

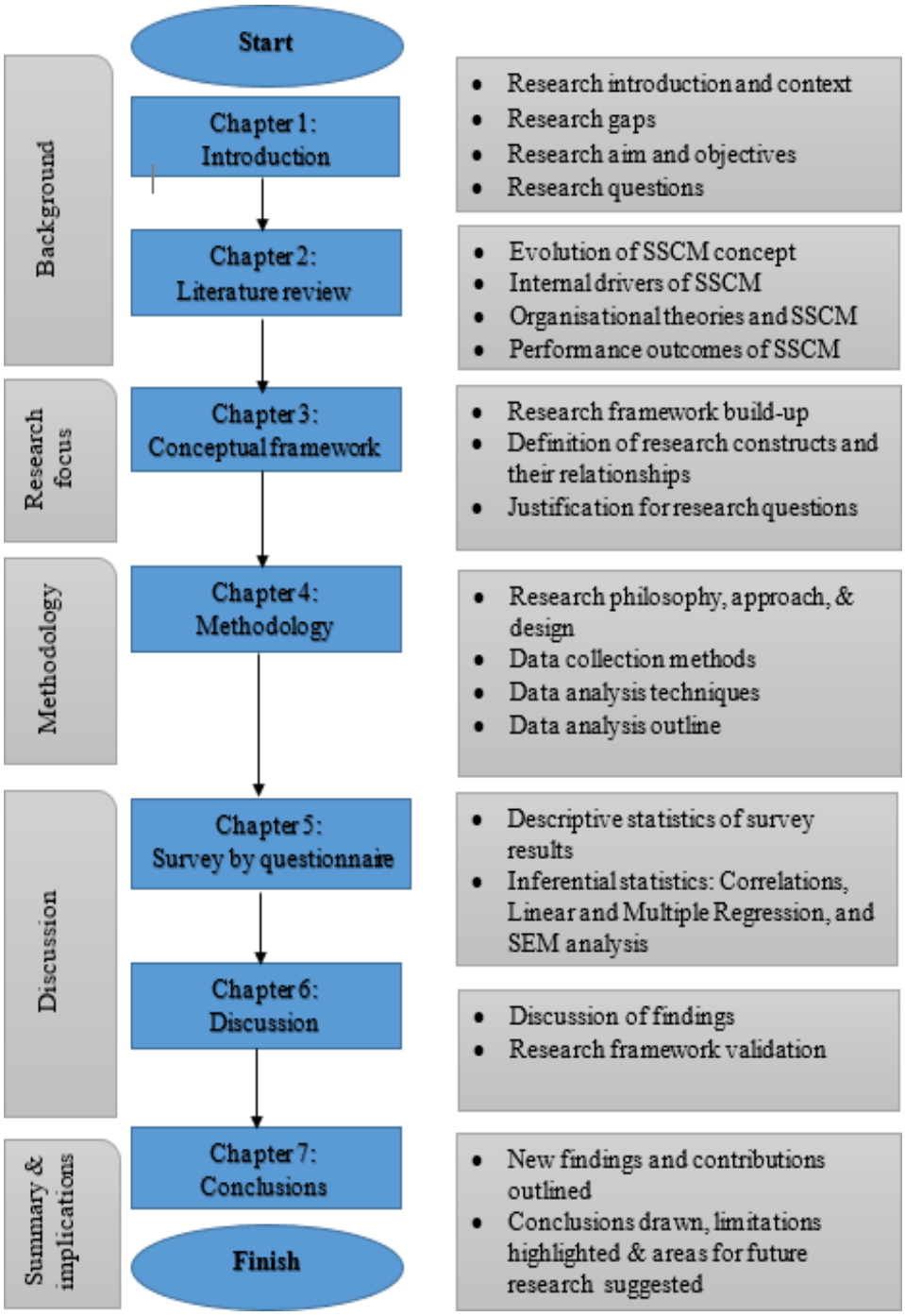

Figure 1. 2 Outline of the thesis.

Chapter 2: Literature review

2.1 Introduction

This chapter generally focuses on the thesis's theoretical foundation. The chapter starts with an overview of supply chain management and how it has shifted its focus to sustainability, highlighting the different terminologies of supply chain sustainability, outlining the key internal drivers of SSCM, and the organisational theories that explains firms' motivation towards SSCM adoption. Afterwards, a review of the performance outcomes of SSCM implementation and a discussion on sustainable practices in the oil and gas industry follows. Lastly, the chapter concludes by presenting the implications of the review, identifying relevant gaps and further research opportunities.

2.2 Supply Chain Management (SCM)

There has been an increasing attention on the concept of supply chain management (SCM) over the past decades (Cooper et al., 1997; Van Weele, 2011). The increasing popularity of SCM could be traced to developments in the sourcing of raw materials. Globalisation of sourcing has enabled firms to search for efficient means of coordinating the flow of raw materials both within and outside the organisation (Mentzer et al., 2011). This is because the conventional method of looking for trade-offs among the different organisational processes (procurement, manufacturing, distribution, and sales) across the supply chain is no longer effective (Corominas, 2013). Generally, SCM seeks to create collaborative efforts among suppliers or partners across a supply chain (Mentzer et al., 2011; Ellram and Cooper, 2014). SCM entails a major shift from the old-style ways of handling buyer/supplier relationships, to a more coordinated management of business relationships among supply partners, which often requires trust and cooperation in order to deliver greater value to end users at the least possible cost to the supply chain (Christopher, 2011; Fathollahi-Fard et al., 2022).

Firms operate in supply chains, from sourcing of raw materials, to consumption by end users (Lambert and Cooper, 2000; Ayers, 2010; Corominas, 2013; King, 2014). A supply chain is a network of interdependent firms working together in a cooperative manner to optimise and enhance the movement of products from suppliers to consumers (Lamming et al., 2000; Harland, 2005; Christopher, 2011). In order to succeed in the constantly changing business environment, firms must utilise the respective strengths and capabilities of supply partners to attain improved responsiveness to business demands (Ayers, 2010; Van Weele, 2011; Fathollahi-Fard et al., 2022). SCM encompasses four main activities: procurement, manufacturing, distribution, and sales (see Figure 2.1). These functions are related to all the major partners in the supply chain either directly or indirectly, which necessitates building a rapport and understanding that can eventually yield a win-win solution to the parties involved (Andersoti et al., 2007; Bratić, 2012; Ellram and Cooper, 2014). SCM, described in Figure 2.1 was sketched from the viewpoint of a production company located in the centre of the supply chain.

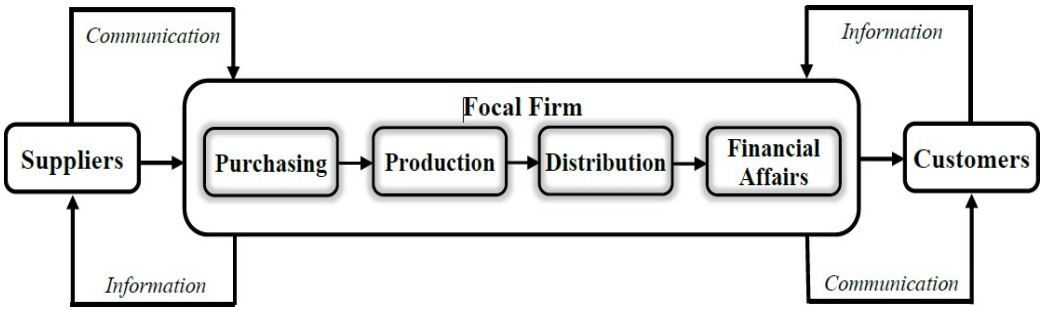

Figure 2. 1: Key activities in SCM (Andersoti et al., 2007; Bratić, 2012)

From the above diagram, it can be seen that procurement involves the buying of commodities or services to satisfy the objectives of a company (Lambert and Cooper, 2000; Van Weele, 2011). Production is the task of mixing components or raw materials and expertise to make finished goods that are useful to the customer (Slack and Johnston, 2007; Nahmias et al., 2015; Lambert and Enz, 2017). Distribution is the process of making products or services available to the customers through direct and indirect ways (Waters, 2003; Lei et al., 2017). Lastly, financial affairs is concerned with maximising sales to improve profitability, which is the primary objective of

business entities (Croxton et al., 2001; Shah and McDonald, 2005; Bratić, 2012). Having discussed the main activities in the supply chain, it is equally vital to define SCM:

- SCM is the extent to which a company systematically cooperates with its supply chain members to manage its internal and external processes, leading to efficient flow of products and services, information, resources, and decisions that will provide maximum customer satisfaction (Stadtler, 2008).

In the 1970s, the term 'pipeline' was used to describe the movement of components and materials through manufacturing process and onto the end user (King, 2014). SCM appeared in the literature in the 1980s and became prominent in 1990s. Prior to this period, similar terms used in business were logistics and operations (Mentzer et al., 2011; Stank et al., 2011). Consequently, the evolution of SCM can be traced back to logistic management (Lambert et al., 1998). Logistics seeks to manage the harmonisation of the needs of individual firms for product and service acquisition with the available resources from suppliers, and distribution functions in order to meet consumer demands. SCM is an advancement of these basic value-adding functions (Handfield et al., 2013). In late 1990s, SCM related publications dominated the journals on marketing, manufacturing, and transportation; thus making the concept a hot topic (Shah and Goldstein, 2006; Mentzer et al., 2011).

SCM has evolved over time due to the availability of advanced information systems that enables tracing and tracking of complex material flow in a timely manner. For example, materials requirement planning, and manufacturing resources planning are forecast driven systems, which works with the support of an advanced computer planning system. In addition, just in time is another planning system aimed at continuously reducing circle times and lead times in order to shorten planning horizons (Van Weele, 2011; Fathollahi-Fard et al., 2022). Other important developments in SCM include the recycling or re-use of commodities from the customers after the end of their useful life, which extends the distribution channels of firms beyond the customers to incorporate the disassembly of finished products for reuse in new ones. In other words, firms are looking for ways to close the loop and ultimately convert used items into new commodities or components capable of meeting other customer needs (Van Weele, 2011; Nguyen et al., 2018).

2.2.1 SCM Objectives

The primary objective of SCM is integration and control of the movement of products through a systematic approach that synchronise multiple functions and various suppliers (Mentzer et al., 2001; Johnsen, 2014). Supply chain performance is improved by means of integration; whether it is with suppliers and/or with customers (Huber and Sweeney, 2007; Gimenez et al.,, 2012). Integration enable supply chains to maintain low inventory (Cooper and Ellram, 1993; Stadtler, 2008). Generally, the central idea of SCM is value creation with the aim of satisfying customer needs (Langley and Holcomb, 1992; Fawcett et al., 2008). Providing high consumer service at low costs can enhance consumers' satisfaction (Lambert et al., 1998; Ayers, 2010). In this respect, the value of a product or service is determined by the extent to which customers are satisfied by the product or service (Mentzer et al., 2001), while customer satisfaction indicates the extent to which a firm produce goods and services that are accepted by customers in the market (Anderson et al., 2008). SCM focuses on synchronizing the needs of the end user with the movement of supplies from suppliers to achieve a balance amid what are generally viewed as opposing objectives: large consumers, low inventory, and minimum unit cost (Cooper and Ellram, 1993; Stevens and Johnson, 2016).

Specific objectives to enhance profitability, competitiveness, and performance of supply chain and its members have been identified by several scholars (Jones and Riley, 2008; Van Weele, 2011; King, 2014). For instance, an important goal of SCM is to minimize the necessary costs of offering a certain amount of customer service. Having said that, SCM seeks to improve efficiency and effectiveness in supply chains through integrated channel management (King, 2014). Langley and Holcomb (1992) contended that SCM philosophy is not limited to only logistics; it includes every activity within a company and its supply chain aimed at fulfilling the needs of the end users. Christopher (2011) noted that SCM is concerned with managing relationships to attain increased cost-effective outcomes for all parties in the chain. However, this drive is not free from problems because sometimes there may be conflicting interests among members of the supply chain.

2.2.2 SCM Processes

Before adopting SCM in a firm, internal and external requirements for implementing the concept have to be satisfied. Internal requirements are the determinants of implementing SCM in the firm such as top management support, financial resources, information technology, training, and

business process reengineering (Cooper et al., 1997; Lambert et al., 1998; Cousins et al., 2008). The external requirements for SCM implementation comprises shared manufacturing arrangements, combined project teams, total system approach, trust, long-term agreements, risk-sharing, as well as information sharing on product development (Cooper et al., 1997; Lambert et al., 1998).

SCM adoption requires suppliers to strive towards satisfying the needs of the focal company's supply chain processes. Consequently, supply base management needs to precede SCM, and companies must put in place effective strategies that will allow them to operate continuously to achieve the benefits derivable from SCM (Harland, 2005; Van Weele, 2011). Numerous scholars (Davenport, 1994; Lambert and Cooper, 2000; Mcadam and Mccormack, 2001) have proposed implementing SCM in business processes however, there is no specific industry standard for the sets of processes to implement. This is will not only enable the use of mutual language among supply chain members, but also, will help in integrating the information technology (IT) systems of the focal firm with that of the supply chain partners to optimise organisational processes (Lambert and Enz, 2017). Mentzer et al. (2001) highlighted a number of important activities that are relevant in SCM adoption including:

- Integrated behaviour - Integration must be expanded to include second tier suppliers and consumers to effectively compete in the market. This requires harmonized efforts among the supply associates (suppliers, transporters, and producers), in order to meet the changing demands of the consumers (Bowersox and Closs, 1996; Ellinger et al., 2012).
- Information sharing – Information sharing between supply chain associates is essential, particularly for scheduling and planning processes (Langley and Holcomb, 1992; Cooper et al., 1997). Sharing of information involves making relevant data available to members of the supply chain, which helps in reducing uncertainty organisational activities (Ellinger et al., 2012).
- Risk sharing - SCM involves sharing supply chain risks over the long term, as this will strengthen commitment and collaboration between supply partners (Ellram and Cooper, 1990; Cooper et al., 1997). However, risk sharing is a difficult task that requires proper coordination and trust to achieve the objectives of such initiative (Cooper et al., 1997).

- Cooperation - SCM entails cooperation among supply partners (Ellram and Cooper, 1990). Collaboration is an activity undertaken by business organisations in order to yield greater results that are mutually anticipated in both short-term and long-term. This requires all parties in the supply chain to work jointly on product development (Anderson and Narus, 2006).
- Shared goals of customer service - Establishing shared goals between supply partners enables a supply chain to not only succeed in achieving enhanced collaboration, but also helps towards minimising the cost of operations (Harland, 2005; Stevens and Johnson, 2016).
- Process integration – Process integration is key in the implementation of SCM, as it will boost sourcing, production, and distribution activities (Harland, 2005; Stevens and Johnson, 2016).
- Long-term relationships - SCM is impossible without associates to create lasting relationships (Harland, 2005). This is because a single firm might find it difficult to perform every part of the activities in a supply chain (Gentry and Vellenga, 2015). Consequently, creating calculated partnerships with supply chain members becomes necessary in order to attain competitive advantage in today's business environment (Gentry and Vellenga, 2015).

However, in trying to meet the requirements of a supply chain, individual firms may encounter opposing interests. For example, the requirement for sustaining maximum level of consumer satisfaction would be to maintain large inventory, while the main determinant of operational efficiency is minimising inventory levels (Lamming et al., 2000; Harland, 2005). Effective SCM requires continuous improvements in customer satisfaction and internal operational efficiency of all members of the supply chain (Van Weele, 2011). This therefore implies that in order to achieve the full benefits of SCM and optimise organisational processes, companies must be consistent in sharing the relevant information with their supply chain partners.

2.3 Sustainability Shift in Supply Chains

Having reviewed the extant literature on SCM in the preceding sections, this section discusses the incorporation of sustainability into SCM, marking the beginning of sustainable supply chain

management (SSCM) concept. Conventional SCM has shifted from being a notion that focuses on addressing operational and economic concerns to being a philosophy that take into account the economic, environmental, and social issues related to a company's supply chain (Carter and Rogers, 2008; Seuring and Müller, 2008; Pullman et al., 2016). This is driven by internal and external pressures that forces companies' conventional supply chains to be conscious of the numerous ecological and social problems arising from their operations (Sarkis, 1999; Zhu et al., 2008; Ahmad et al., 2017; Fathollahi-Fard et al., 2022). The transition from conventional supply chain to the sustainable supply chain strategy put emphasis on a variety of activities including sustainable procurement, sustainable production, sustainable distribution, and reverse logistics (Esfahbodi et al., 2016). Figure 2.2 depicts how SCM has evolved from its traditional focus of logistics management to sustainable supply chain approach.

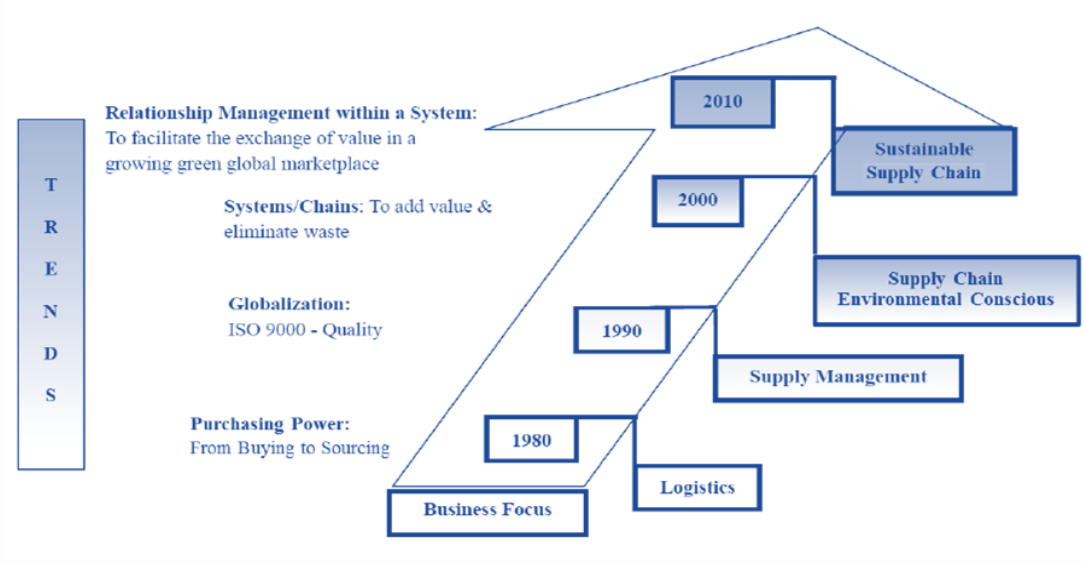

Figure 2. 2: Evolution of sustainability in supply chain (Gilbert, 2001).

Historically, researchers and ecologists have paid little attention on sustainability. The idea of sustainability originated from the 1970's conservationism, which was driven by the Neo-Malthusian perspective that humans have begun to exceed the average capacity of the world (Yates, 2012). In this respect, researchers became interested in exploring the causes of environmental problems Around the early 1980s, (Tanguay et al., 2010; Duran et al., 2015;

Silvestre, 2015). Prior to the use of the term “sustainability” in the relationship between humans and nature, a considerable number of ecologists have insisted that failure to consider the long-term effects of industrial activities may cause irreversible damage to the natural environment (Kidd, 1992; Mebratu, 1998; Swart et al., 2004).

Important developments concerning sustainability began during the United Nations (UN) extraordinary conference on human environment held in 1972 in Stockholm. This session recognised the significance of environmental management and the adoption of environmental evaluation as a necessary strategy (Mebratu, 1998; Du Pisani, 2006). After the Stockholm conference, the Woodlands Conferences followed (1975, 1977, 1979, and 1982), and the document prepared in 1974, made use of the term “sustainability” in the context of development for the first time (Kidd, 1992).

Few years later, the World Conference on Environment and Development (WCED), sponsored by the UN, picked up the term “sustainability”. The WCED report, also called “Our Common Future” - Brundtland Commission, produced the famous triple theoretical framework through which to assess any activity as really sustainable. This framework comprises of the sustainability three Es, namely Economy, Environment, and Equity (Pearce and Atkinson, 1993; Yates, 2012). Since the Brundtland’s framework, sustainability has grown tremendously across international boundaries, with diverse interpretations (Mebratu, 1998). Bearing in mind the institutional basis of WCED as well as the realities witnessed around the world in 1980s, the WCED’s proposed definition of sustainable development was considered to be very comprehensive, which has shaped the current emerging developments regarding the new worldview (Yates, 2012).

The United Nations’ Conference on Environment and Development (UNCED), also called the "Rio Conference", is another important milestone after the WCED. One of the objectives of this conference was that participant nations would be required to present a draft statement on their ecological and social sustainability strategies as well as formulate a road map for enhancing sustainable development in their respective countries and beyond (Mebratu, 1998). UNCED resolutions include the Agenda 21, Rio proclamation on climate change, desertification, and biodiversity.

While the aforementioned decrees were seen as laudable achievements, the most significant legacy of UNCED was the preceding preparatory events held in various geographical locations across the

globe, comprising of four International Preparatory Committee (PrepComs) meetings. This process being the first of its kind brought the concept of sustainability to the grassroots, thereby engaging various stakeholders across different countries, and addressing the questions such as, what does it really mean, what is the extent of commitment towards becoming sustainable, and so on. The UNCED brought together prominent individuals, and representatives of governments, business, media, and civil society, in order to develop a universal agenda for action on sustainability. Some of the goals of this conference include the creation of awareness on sustainability and ensuring more commitment towards sustainable development in various spheres of life (Mebratu, 1998; Yates, 2012).

In late 1997, the heads of governments met in Tokyo to discuss the non-compliance of many countries regarding the limit of greenhouse emissions agreed in 1990, and to address the problem of global warming (French, 2004; Dresner, 2012). This meeting, also known as the Tokyo Protocol, pushed for a reduction in the level of greenhouse gases by a minimum of 5% from 1990 levels, to be achieved before the year 2012. Fifty-five countries (developed and developing) signed this agreement (Dresner, 2012). Similarly, the Paris Climate Agreement was signed in 2015, by a number of countries in an attempt to address the issue of climate change (Clémençon, 2016).

Despite the important steps in the development of sustainability, some critics of sustainability argued that the idea would witness a decline in practice as the notion of appropriate technology did over time (Mebratu, 1998). Other scholars (Pearce, 1988; Molotch and Daly, 2006) have described sustainability as a "vague" concept. Contrary to these assertions, sustainability has received considerable attention in both theory and practice, thereby making the concept to be the focus of policy makers, industry practitioners, academicians, and institutions. This increased recognition has widened the discourse on the idea of sustainability.

In recent years, publications on sustainability have become the major focus of periodicals in diverse areas (Barr, 2003). Governments have introduced environmental policies to ensure that firms are sustainable in their business activities (Halldórsson et al., 2009; Paulraj et al., 2017), and stakeholders are putting pressure on firms to improve their sustainability performance not only in financial aspect, but also in ecological and social aspects (Ashby et al., 2012). Consequently, corporations nowadays are increasingly realising the importance of sustainability practices and making efforts towards designing and implementing them. Corporate sustainability practices are

strategies designed to balance the needs of both the firm and society (Pullman et al., 2009; Gotschol et al., 2014; Engert et al., 2016).

2.4 Terminologies of Supply Chain Sustainability

Supply chain sustainability has been described using a number of terminologies in the literature (Srivastava, 2007; Ashby et al., 2012; Luthra et al., 2015). This lack of consensus among researchers concerning the terminology for supply chain sustainability stems from the variations in definitions and interpretations of the concept (Seuring and Müller, 2008). In the last two decades, researchers have linked sustainability idea with SCM through different perspectives using various terms (Walker and Jones, 2012). Key terminologies used in incorporating sustainability into the management of supply chains include sustainable development (WCED, 1987; Williams and Millington, 2004), sustainable supply chain management (Wan Ahmad et al., 2016; Paulraj et al., 2017; Jia et al., 2018; Gardas et al., 2019), and green supply chain management (Srivastava, 2007; Zhu et al., 2008; Ahi and Searcy, 2013). Others are closed loop supply chain/ reverse logistics (Ashby et al., 2012), environmental sustainability (Goodland, 2003; Morelli, 2013; Macdiarmid, 2014), and social sustainability (Carter and Jennings, 2004; McWilliams and Siegel, 2011). The next sections explain these terminologies of supply chain sustainability.

2.4.1 Sustainable development

The terminologies "sustainable development" and "sustainability" are used interchangeably in extant literature. These terms have been defined in many ways by scholars (Ahi and Searcy, 2013). According to WCED (1987), sustainable development is "development that satisfies the requirements of the current generation without hindering the capability of future generations to satisfy their own desires. Williams and Millington (2004) states that sustainability entails giving equal attention to the three fundamental aspects of development: the economic, environmental, and social aspects (Williams and Millington, 2004). A number of scholars (Hansen and Jones, 1996; Hodge, 1997; Kuhlman and Farrington, 2010; Károly, 2013; Smith, 2015) have also defined sustainability based on these three basic components.

From an economics point of view, sustainability refers to a set of undertakings that increases economic gains, while preserving the natural environment for future use (Segerson et al., 2006).

In the corporate world, sustainability is viewed as development that satisfies the wants of an organisation's stakeholders (shareholders, personnel, customers, pressure groups, and host communities) without hampering the possibility of future stakeholders to satisfy their own needs (Dyllick and Hockerts, 2002). Firms that are able to make profit for their stakeholders, preserve the environment in which they operate and enhance the wellbeing of all stakeholders, are considered as sustainable organisations (Pearce and Atkinson, 1993; Savitz and Weber, 2014).

Sustainability is a very complex idea that transcends organisational boundaries (Sathiendrakumar, 2004). Sustainability is jointly supported by three pillars: economic prosperity, environmental protection, and social equity (Bansal, 2005). Thus, sustainability exists when there is a satisfactory balance amongst the financial/economic, environmental, and social bottom lines.

Economic sustainability is attaining long-term profitability and economic progress in a responsible way while protecting the environment and its inhabitants (Yusuf et al., 2013). It is concerned with much more than maximising profitability, but however, it is about making sure that industrial actions do not cause environmental and social burden. Economic sustainability involves cutting the cost of operations through effective coordination of activities, enhanced productivity, and enticing a variety of financiers, which are necessary for the long-term survival of businesses that leads to sustainable economic development (Tsai and Hung, 2009; Sarkis et al., 2010; Wheeler, 2013). Economically viable firms always possess sufficient financial flow and strive towards generating significant return on investment (Tsai and Hung, 2009). The focus of economic sustainability is on economic capital, because it represents the overall value of assets after controlling for liabilities (Dyllick and Hockerts, 2002). However, the fact that a firm generates profit is not a guarantee for its long-term survival, or an indication of positive impact on its immediate environment and social factors (Doane and MacGillivray, 2001). Therefore, since overlooking environmental and social factors hinders the achievement of economic sustainability, sustainability efforts must focus on creating long-term financial security for organisations without any decline in environmental condition and wellbeing of people (Elkington, 1998).

Environmental sustainability has received considerable attention from scholars in the last two decades (Carter and Easton, 2011). It involves protecting and safeguarding the available resources in the environment, such as bionetworks, water, forest reserves, air, and land (Goodland, 2003; Jamali, 2006; Morelli, 2013). The environment is a fundamental aspect of sustainability, as it

produce the raw materials needed to satisfy human needs (Paulraj et al., 2017). Concerns about the excessive consumption of natural resources and the adverse impact of industrial activities on the ecosystem has forced stakeholders to request for products and services that are environmentally friendly, in order to reduce activities that may compromise the ability of future generations to enjoy the natural resources (Jamali, 2006; Esfahbodi et al., 2016). The central idea is that firms or people must avoid generating additional waste than the ecosystem can absorb. This means that the natural environment should be preserved for future use (Molotch and Daly, 2006). Nonetheless, environmental sustainability is not just about obeying existing regulations, it involves a systematic method of managing organisational activities from sourcing to end use. This comprises evaluation of products, waste reduction, emissions control, and boosting the effectiveness of human and material resources (Wagner, 2005; Carter and Rogers, 2008; Luthra et al., 2016).

Social sustainability involves minimizing the negative effect of industrial activities on employees and other members of the society (Jamali, 2006; Hutchins and Sutherland, 2008). In this regard, the interests of different stakeholder groups are taken into account and systematically balanced (Hutchins and Sutherland, 2008). The social dimension of sustainability centres on health and safety, education, talents, and general societal wellbeing (Caulfield et al., 2006; Dempsey et al., 2011). Socially sustainable firms tend to generate additional value to their host communities through enhancing the human capital of individual partners and promoting the wealth creation prospects of their immediate societies (Hoffman and Bazerman, 2007). Primarily, social sustainability is viewed as a means of attaining both ecological and economic objectives concurrently. In doing so, business entities must strive towards enhancing and preserving the living condition of people without inflicting negative environmental impacts and excessive consumption of the natural resources (Dyllick and Hockerts, 2002). Thus, socially responsible firms strive towards integrating their operational activities, social, ethical, and environmental concerns beyond the requirements of policy makers and stakeholders (Dyllick and Hockerts, 2002; Kaynak and Montiel, 2011; Paulraj et al., 2017).

2.4.2 SSCM vs. GSCM

As mentioned in section 2.4, several scholars have discussed the concept of sustainability in SCM context from different perspectives using various terms such as sustainable supply chain management (SSCM), green supply chain management (GSCM), and closed loop supply chain

(Ashby et al., 2012). While the dominant terminologies used by scholars are SSCM (Seuring and Müller, 2008; Walker and Jones, 2012; Ahmad et al., 2017) and GSCM (Srivastava, 2007; Mangla et al., 2014; Luthra et al., 2016; Habib et al., 2021), there are many overlapping concepts within these two terms. In view of this, it is important to distinguish between GSCM and SSCM terminologies and clarify the one that is deemed suitable for this research.

GSCM refers to the act of preserving and safeguarding the natural environment, with the sole aim of enhancing environmental performance in the supply chain context (Srivastava, 2007; Zhu et al., 2008; Sarkis et al., 2011). GSCM is often criticised for focusing on the environmental aspect of sustainability only and neglecting the social and economic aspects (Luthra et al., 2015; Habib et al., 2021). The notion of GSCM along with its numerous components has had different variations over time. Nevertheless, many scholars have defined GSCM from the same point of view, which is environmental practices within the supply chain (Emmett and Sood, 2010; Ahi and Searcy, 2013). GSCM seeks to integrate environmental considerations into activities related to an organisation's supply chain (Vachon and Klassen, 2006; Emmett and Sood, 2010). The primary objective of GSCM is to improve the performance of supply chains in environmental aspects through minimizing adverse environmental effects (Zhu et al., 2008; Habib et al., 2021; Beiranvand and Dorniani, 2022).

SSCM on the contrary, is an all-inclusive term that not only emphasise environmental sustainability, but also promotes social and economic sustainability across the whole supply chain (Walker and Jones, 2012; Seuring, 2013; Siems et al., 2021; Kottala, 2021). SSCM is considered as a combination of SCM, environmental management, and corporate social responsibility (Wagner and Svensson, 2010; Kassaneh et al., 2021; Khan et al., 2021). SSCM concept involves considering environmental concerns, economic goals, and social issues within the SCM simultaneously (Linton et al., 2007; Pagell and Wu, 2009). The concept of SSCM stresses the accomplishment of economic objectives in a responsible manner that considers the environmental and social issues related to companies' supply chain operations (Lintukangas et al., 2015; Raut et al., 2017; Minardi et al., 2021). Generally, SSCM aims to ensure economic, environmental, and social sustainability in supply chain processes so that the overall performance of supply chain members can be improved and optimised (Seuring and Müller, 2008; Carter and Easton, 2011; Munoz-Torres et al., 2021).

GSCM and SSCM have been used interchangeably in different contexts from different perspective given the wide nature of sustainability notion. Nonetheless, much of the literature affirms that GSCM is typically concerned with only environmental aspect, whereas SSCM is a multi-dimensional concept that considers environmental, social, and economic goals (Ahmad et al., 2017; Paulraj et al., 2017).

Consequently, this study employs the SSCM terminology considering the comprehensive scope of the concept. Unlike GSCM, the SSCM approach addresses the economic, environmental, and social implications within the whole supply chain simultaneously (Esfahbodi et al., 2016; Heidary Dahooie et al., 2021). Additionally, the use of SSCM term allows this research to answer its key objective, which is examining the link between the implementation of SSCM practices and business performance.

Given the growing interest of researchers, policy makers, and industry practitioners on SSCM, it is no doubt an area that is worthy of empirical investigation (Matos and Hall, 2007; Gardas et al., 2019; Van Nguyen et al., 2021). However, despite the increasing number of empirical and non-empirical studies on the topic, there are still challenges that hamper the successful implementation of SSCM, including potential costs, complexities in managing different proactive practices, and lack of adequate understanding of SSC initiatives among supply chain partners. Whilst significant attempts have been made towards addressing some of the challenges, more advancement of SSCM field is also needed (Linton et al., 2007; Tseng et al., 2015; Esfahbodi et al., 2016).

2.5 Sustainable Supply Chain Management (SSCM)

The idea of SSCM has gained much attention in both practice and theory, because of a number of factors encouraging its adoption such as stakeholder pressure, shortage of components and materials, competitive rivalry, and ecological apprehensions regarding the adverse effects of industrial activities (Walker et al., 2008; Gopalakrishnan et al., 2012; Elmsalmi et al., 2021). Companies in recent times have concentrated on adopting strategies that simultaneously addresses the financial, environmental, and social problems associated with their supply chains (Zailani et al., 2012; Yusuf et al., 2013; Brat et al., 2021). SSCM is considered to be a workable strategy that can assist business entities to successfully integrate financial, ecological, and social considerations,

which ultimately yields a competitive edge (Paulraj et al., 2017; Cui et al., 2021). SSCM provides various opportunities for a company to differentiate itself from other competitors (Carter and Rogers, 2008; Gopalakrishnan et al., 2012; Elmsalmi et al., 2021).

The SSCM approach integrates the ideologies of SCM, CSR and environmental management in order to not only minimise environmental destruction, but also improve the performance of the supply chain (Linton et al., 2007; Walker et al., 2008; Carter and Easton, 2011). In extant literature, there is no one specific definition of SSCM. Scholars have defined SSCM in different ways:

SSCM is "the management of material, information and capital flows, as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e. economic, environmental and social, into account which are derived from customer and stakeholder requirements" (Seuring and Müller, 2008, p. 1700).

SSCM is the effective management of an organisation's internal practices (sustainable process and products), as well as external practices (cooperation between suppliers and consumers), in order to build a sustainable supply chain (Paulraj et al., 2017).

SSCM is the administrative decisions and actions formulated to make sure that the performance of a supply chain is improved across the triple bottom line dimensions, which is a precondition for achieving supply chain sustainability (Pagell and Wu, 2009).

SSCM encompasses a systematic coordination of supply chains through integrating economic, social and environmental concerns with core inter and intra organisational processes, put in place to efficiently coordinate the end-to-end activities of supply chains to meet shareholder demands and boost short-term and long-term profitability of the firm (Ahi and Searcy, 2013).

SSCM involves a shift from the traditional approach of maximising profit to embracing necessary steps to protect the environment and society in which a firm and its supply chain partners operate (Srivastava, 2007).

In light of the lack of clarity on the definition of SSCM, a number of researchers have used the complementary definition sustainability and SCM to introduce a more comprehensive and all-inclusive SSCM definition:

The calculated incorporation and attainment of an organisation's economic, social, and environmental objectives in the management of key organisational activities, in order to improve the overall performance of supply chain members in the long-term (Carter and Rogers, 2008). Figure 2.3 depicts the conceptualisation of SSCM.

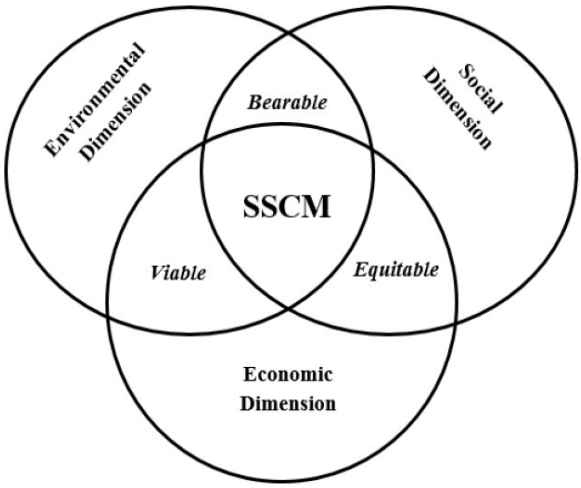

Figure 2. 3: SSCM Conceptualisation (Seuring and Mueller, 2008)

In this study, the aforementioned definition of SSCM is used because it serves as a foundation for operationalising the idea of sustainability within the SCM context. Hence, this definition implies that SSCM put emphasis on attaining a balance between the triple bottom line components. The intersection between the three dimensions represents what sustainability truly means for organisations and their supply chains (Seuring and Mueller, 2008). SSCM is generally about undertaking a variety of environmental and social activities to lessen the environmental impacts associated with supply chain processes, while taking into consideration the economic objectives of the focal firm (Matos and Hall, 2007; Kassaneh et al., 2021). In other words, the environmental and social activities must add value and/or not ruin the economic performance of companies (Gardas et al., 2019). From a holistic perspective, SSCM aims to address the environmental, social, and economic goals of the focal organisation as well as members of its supply chain (Carter and Easton, 2011; Raut et al., 2017).

SSCM is a multi-dimensional concept that comprises of three elements: environmental, social, and economic aspects (Dyllick and Hockerts, 2002; Markley and Davis, 2007). Researchers suggest giving equivalent consideration to these components of sustainability in a firm's activities (Carter and Rogers, 2008; Gopalakrishnan et al., 2012). More so, integrating the three elements will help in designing activities for sustainability implementation (Goodland, 2003; Silvius and Schipper, 2014a; Khan et al., 2021). However, in the business environment, firms are faced with the challenge of integrating these elements in their supply chains (Sharma and Henriques, 2005). Although each element is independent, they are mutually dependent on one another (Carter and Rogers, 2008; Townsend, 2009; Arena and Azzone, 2010; Perez-Batres et al., 2010). Thus, a firm is considered sustainable when it ensures a balance among the triple components, resulting in economic profitability, environmental safety, and social equity (Silvius and Schipper, 2014; Silvestre, 2015; Paulraj et al., 2017).

Universal apprehensions about climate change, unstainable usage of raw materials, and financial uncertainties have pushed numerous companies to re-examine the way they function (Walker and Preuss, 2008; Wagner and Armstrong, 2010). Increasing calls for firms to enhance the environmental, economic and social performance of their supply chains stems from the environmental impacts caused by globalisation (Seuring and Gold, 2013). SSCM is deemed one important measure that can be implemented in order to make sure that financial goals, ecological protection, and social equity are achieved simultaneously throughout a supply chain (Gupta et al., 2011; Gurtu et al., 2016; Raut et al., 2017).

While many organisations adopt SSCM due to external pressure from various stakeholders, other firms undertake SSCM practices in an attempt to create a better image and achieve its long-term benefits (Seuring and Müller, 2008; Vermeulen and Seuring, 2009; Walker and Jones, 2012). In essence, firms are required to embrace a more proactive approach towards SSCM, instead of the traditional reactive stance of meeting stakeholder requirements (Vachon and Klassen, 2006; Vachon and Mao, 2008). Engaging in sustainable practices to reduce the negative social and ecological effects of supply chains will not harm the economic performance of corporations, but rather, environmentally and socially sustainable supply chains provide improved economic performance for the supply chain partners (Vachon and Mao, 2008; Reefke et al., 2010).

As the main priority for firms is to maximise shareholder wealth, it is not surprising that business entities would be driven to accomplish their economic goal through activities that negatively affects the environment as long as those activities can go unnoticed (Campbell, 2007). For example, a number of irresponsible activities such as environmental damage, exploitation of employees, and air pollution have been reported in previous studies (Roe, 2011; Vogel, 2012). Moving from SCM to sustainable SCM creates the need for organisations to adjust their traditional supply chains in order to incorporate sustainable approaches (Schrettle et al., 2014; Minardi et al., 2021). SSCM encourages firms to integrate different types of practices in their business processes, such as cleaner production methods, product returns, improved working conditions, human rights protection, equality and cultural diversity, as well as health and safety (Reefke et al., 2014; Xie, 2016).

SSCM put emphasis on waste reduction, environmentally friendly products and process design, emission reduction, pollution reduction, and enhancing the overall quality of life (Gopalakrishnan et al., 2012; Rajak and Vinodh, 2015). Several studies observed that pollution originates from ineffective handling of material resources in manufacturing processes (Linton et al., 2007; Kaynak and Montiel, 2011; Khan et al., 2021). Pollution prevention offers substantial savings in terms of cost of production (Markley and Davis, 2007). Today, many entities are focusing on ways to minimize the negative impacts caused by their operations and lessen the expenses associated with production (Reefke et al., 2014; Raut et al., 2017; Gardas et al., 2019). The idea of minimizing environmental impacts was originally based on enhancing products image through a bundle of initiatives such as ‘green products’ and ‘green logistics’ (Reefke et al., 2010; Habib et al., 2021). Recently, the focus has moved to issues concerning environmental impacts of supply chains (Ahi and Searcy, 2013; Govindan et al., 2015).

Firms’ sustainability efforts must extend beyond internal management and include the supply chains because a significant percentage of the value of products is obtained from suppliers (Seuring and Mueller, 2008). SSCM requires an all-inclusive approach, one that considers the focal firm and its entire supply chain (Zhu and Sarkis, 2006; Carter and Easton, 2011). In today’s business environment, competition has moved from enterprise versus enterprise to supply chain versus supply chain. This development, therefore, makes the incorporation of sustainable strategies into the management of supply chains worthwhile (Walker and Jones, 2012; Munoz-Torres et al., 2021; Van Nguyen et al., 2021). However, the degree to which enterprises collaborate with business

partners to ensure ethical and eco-friendly behaviour across the supply chain differs (Mangla et al., 2014; Luthra et al., 2015; Minardi et al., 2021). In this respect, Luthra et al. (2016) recommends that the focal firm and its suppliers must work closely on sustainability issues with the aim of ensuring economic, social, and environmental performance of the supply chain. This is because, a supply chain that is really sustainable not only contribute to the economic bottom line, but equally improves the social and environmental bottom lines (Raut et al., 2017; Gardas et al., 2019; Habib et al., 2021).

Much of the literature on SSCM has shown that firms could achieve a reduction in operational cost as a result of SSCM implementation in business supply chains. For example, Vance et al. (2015) observe that aside from the significant reduction in environmental footprints, costs savings of approximately 25% could be realised through using renewable energy resources, which offers more value for money when compared to electricity used from natural gas. Bevilacqua et al. (2014) explored the effect of a cotton supply chain on the environment. They observed that during manufacturing activities, the usage of energy optimisation methods results in emissions reduction by 40% and decrease in energy use by 8%.

Generally, firms can achieve improvements in material and energy efficiency (Lee and Wu, 2014), quality and innovation (Svensson, 2007), and a better corporate reputation (Eltayeb et al., 2011) through effective implementation of SSCM practices across their supply chains. In the highly competitive business world, SSCM should not be seen simply as a concept. However, it should be viewed as an important tool that has the potentials to improve corporate effectiveness in terms of economic, environmental, and social performance (Linton et al., 2007; Pagell and Wu, 2009; Esfahbodi et al., 2016). The next section operationalises the SSCM concept.

2.5.1 Key components of SSCM

Having reviewed SSCM concept, providing a detailed insight into the key components and processes involved in SSCM philosophy is important, in order to operationalise the concept. SSCM has been operationalise in a variety of ways for different purposes and industrial sectors (Svensson, 2007; Wagner, 2010; Yusuf et al., 2013; Hong et al., 2022; Tseng et al., 2022). In the context of this research, SSCM is considered as the management of material resources from sourcing to production and consumption, in an effective way that ensures minimum negative ecological impacts (Wagner and Sarkis, 2013; Diabat and Govindan, 2011; Kottala et al., 2021). SSCM

extends beyond the narrow focus of traditional supply chain to include a bundle of practices to reduce the environmental impacts associated with products life cycle, such as sustainable procurement, eco-design, reduction of hazardous substances, decreased use of energy and materials, as well as product recycling and disposal after use (Simpson et al., 2007; Svensson, 2007; Carter and Rogers, 2008; Hu and Hsu, 2010; Su et al., 2021).

Therefore, this implies that SSCM philosophy encompasses multiple boundary spanning activities, comprising sustainable purchasing, which advocates procuring materials with the least environmental impacts; sustainable production, which emphasises internally driven environmental initiatives such as reuse and reproduction; sustainable distribution, which facilitates reduction of logistical impacts caused by material flows; and reverse logistics, which entails closing the loop through recycling and disposal. These boundary-spanning activities requires the support and cooperation of supply chain partners (Vachon and Klassen, 2007; Zhu et al., 2008).

A simplified SSCM system has four basic components: sustainable procurement, production, distribution, and reverse logistics (Carter and Easton, 2011; Esfahbodi et al., 2016; Paulraj et al., 2017). However, it should be noted that social sustainability practices are not captured in these four components. These fundamental components of SSCM are shown in the diagram below.

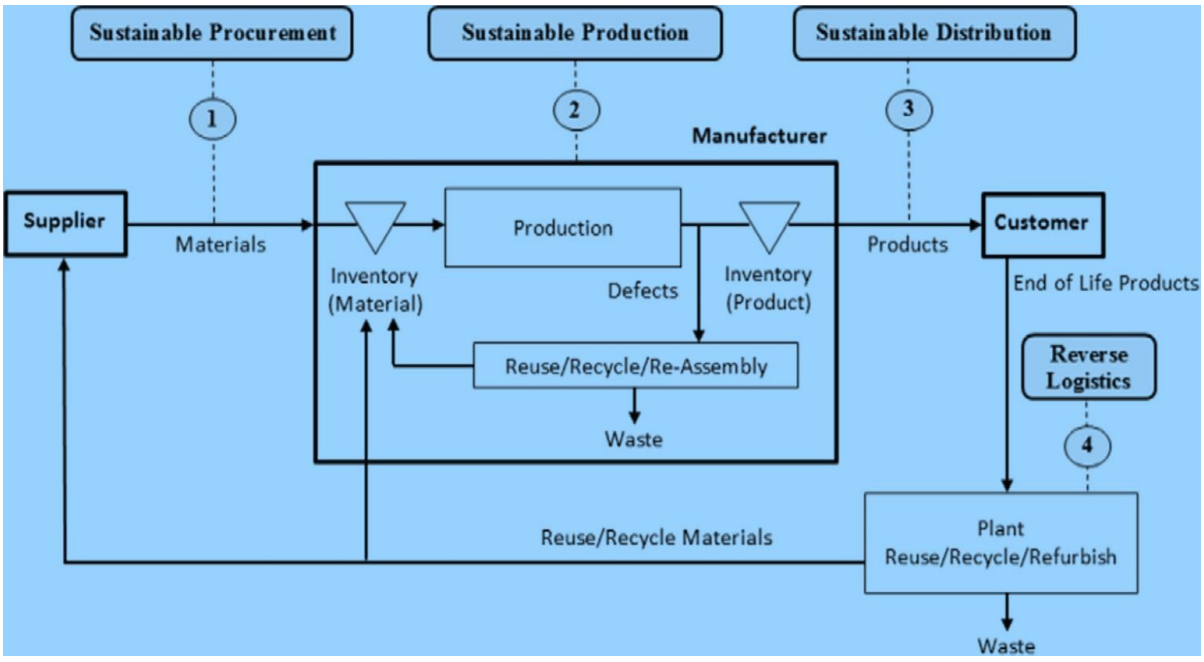

Figure 2. 4: Key components and activities in SSCM system (Esfahbodi et al., 2016)

Based on the illustrations on figure 2.4, sustainable procurement from the viewpoint of the focal firm, is generally focused on creating a collaborative effort with suppliers to provide manufacturers with raw materials that have little negative impacts on the environment (Esfahbodi et al., 2016). Thereafter, the manufacturer uses these environmentally friendly materials in an effective way to produce products that requires minimum amount of energy in the production process (Vachon and Klassen, 2008; Gunasekaran and Spalanzani, 2012; Cui et al., 2021).

Sustainable production encompasses various value-adding activities such as recycling, reuse and reassembly of defects and excess inventories, which can used as material inputs in subsequent manufacturing processes (Chung and Wee, 2011; Cui et al., 2021).

Sustainable distribution is about ensuring that finished products are being transported in a manner that minimises negative logistical impacts (Vachon and Klassen, 2006; Chung and Wee, 2011).

Lastly, reverselogistics involves closing the loop in the supply chain through allowing a return of products after their end-of-life. It primarily facilitates the reuse and recycle of used products to reduce the life cycle impacts on the environment (Jayaraman et al., 2007; Esfahbodi et al., 2016).

It is worth mentioning that the abovementioned components involved in SSCM originated from the key functions of conventional SCM (see figure 2.1). In this respect, the main components of SSCM are consistent with the core elements in SCM because all the components of a typical SSCM system, comprising sustainable purchasing, production, distribution, and reverse logistics are directly related to the traditional SCM activities. However, SSCM extends beyond the narrow economic and operational focus of traditional SCM, by incorporating sustainability ideas in supply chains to address environmental concerns and reduce environmental impacts (Seuring and Müller, 2008; Gupta et al., 2011; Raut et al., 2017). The subsequent sub-sections briefly explain the main SSCM components.

2.5.1.1 Sustainable procurement

According to Zsidisin and Siferd (2001), sustainable procurement is an approach to sourcing and purchasing that emphasise cooperating with supply partners to provide services and products that are friendly to the environment. It generally comprises a bundle of environmental purchasing activities that ensure reduction of material and energy consumption, as well as facilitate the reuse of materials (Carter and Jennings, 2004; Esfahbodi et al., 2016; Sanchez-Flores et al., 2022). This

approach begins with evaluation and selection of suppliers to ascertain the extent to which the materials meet the criteria for ecological consciousness in order to mitigate environmental impacts (Min and Galle, 2001; Carter, 2005; Cui et al., 2021). In essence, organisations can address environmental issues through implementing sustainable initiatives in their purchasing process (Zsidisin and Siferd, 2001; Vachon and Klassen, 2008; Sanchez-Flores et al., 2022).

As shown on figure 2.4, the activities in sustainable procurement spread beyond the focal firm, to include suppliers and manufacturers, with the aim of purchasing sustainable inputs (Carter and Carter, 1998). In view of this, it is vital to form excellent relationships with supply partners in order to put in place effective environmental initiatives that will promote the development of responsible goods and services (Paulraj et al., 2008). To achieve the goal of reducing environmental impacts in procurement activities, firms must work closely with different suppliers and second tier suppliers (Carter and Carter, 1998). In operational terms, sustainable procurement encompasses a variety of practices, including ISO 14000 certification for suppliers, suppliers environmental audit, and internal environmental management (Davim, 2013).

2.5.1.2 Sustainable manufacturing

Sustainable manufacturing simply means an effective production process using raw materials with the least negative impacts on the ecosystem, which result in lesser amount of waste and pollution (Setchi et al., 2016). It is also referred to as clean production or green manufacturing (Dües et al., 2013). Initially, Crainic et al. (1993) introduced the concept and its further development by a number of scholars led to the inclusion of sustainable design in the system (Handfield et al., 2005; Vachon, 2007). In the last two decades, the idea of sustainable manufacturing has been the focus of many business entities (Gardas et al., 2019). The approach requires producers to make goods in an ecologically friendly manner, which reduces the amount of energy usage and avoids the use of components that have adverse effects on the ecosystem (Kuik et al., 2011).

Many researchers have pointed out the importance of sustainable design in the sustainable production process (Zhu and Sarkis, 2006; Paulraj et al., 2017). Primarily, it covers the supply chain related environmental activities involved in the manufacturing process (Varsei et al., 2014). The success of sustainable manufacturing is determined by the commitment of the focal firm in terms of collaborating with suppliers to ensure cleaner production and eco design (Grote et al., 2007; Davim, 2013; Setchi et al., 2016). Sustainable approach in the manufacturing process can

help in closing the loop in supply chains by facilitating the reuse and reproduction of by-products, which lessen the negative environmental impacts of products life cycle (Preuss, 2001). Firms seeking to improve their environmental performance must take sustainable manufacturing seriously, because it is directly linked to the whole product's life cycle (Miller et al., 2010). Thus, sustainable production is the most significant activity in SSCM context.

2.5.1.3 Sustainable distribution

Sustainable distribution is an effective way of transporting products along the supply chain. The process, which starts from the suppliers point to manufacturer and down to the end user, is aimed at achieving the least impact on the environment (Esty and Winston, 2006; Svensson, 2007). Generally, sustainable distribution is an approach that focus on packaging and distributing products in a manner that mitigate the negative environmental impacts related to the movements of products (Sarkis et al., 2001; Vachon, 2007). It covers the entire process of distribution, comprising order handling, storage and inventory management, product labelling and packaging, product delivery, as well as returns processing (Vachon and Klassen, 2006; Vachon, 2007). This approach incorporates sustainability initiatives in the traditional distribution system in supply chains to minimise the logistical impact caused by the flow of goods and components (Sarkis, 2007).

The primary focus of sustainable distribution is on product packaging and logistical activities. On one hand, the type of packaging such as shape, volume and items used in most cases, have a considerable impact on the entire process of distribution partly because of their direct link to the footprint left behind in the course of transporting the products (Emmett and Sood, 2010). In this regard, effective packaging approach can help in reducing the amount of material consumption and congestion in warehouse, which will improve firms' environmental performance. On the other hand, logistical activities deal with the planning and design of a distribution network and making the appropriate logistical decisions. Researchers have pointed out key decisions of distribution that organisations face, including central warehousing or distribution links, direct or indirect shipment, private fleet or third party delivery, and single mode or intermodal (Esfahbodi et al., 2016).

In sustainable distribution, logistical activities designed to minimise negative environmental impacts include establishing direct links, mitigating empty miles, fewer shipments, and lesser handling (McKinnon, 2005; Esfahbodi et al., 2016). All these activities have positive impacts on

the environmental, economic, operational performance of business entities due to the role they play in reducing waste, emissions, delivery time, and improving cost effectiveness, quality and responsiveness (Walke et al., 2010)

2.5.1.4 Reverse logistics

Reverse logistics is defined as the process of retrieving unused or end-of-life products from the final point of consumption for the purpose of recycling, reproduction, and in some cases for appropriate disposal. It is simply the opposite of forward or traditional logistical approach (Van Hoek, 1999; Dowlatshahi, 2005). In this approach, manufactures are required to collect the products that were previously distributed for possible reuse, recycle, and disposal. Theoretically, reverse logistics encompasses the coordination of products flow from the point of final use and back to the initial point of production with the aim of creating value. Thus, firms that implement the reverse logistical strategy are considered environmentally sustainable (Mollenkopf et al., 2007; Simpson et al., 2007).

Recently, reverse logistics has evolved beyond its initial focus of recapturing the end-of-life products value, to include sale of excess by-products and materials (Lai et al., 2013). The investment recovery initiative enables firms to sell excess products, materials, and assets, which makes it the core sub-component of reverse logistics activity (Zhu et al., 2008; Green et al., 2012). Investment recovery seeks to increase the entire value of end-of-life products through mitigating the environmental impacts associated with products life cycle while improving the financial performance of firms (Zhu et al., 2010). Consequently, investment recovery practice is adopted in this study, as it represents the activities involved in reverse logistics and strives towards closing the loop in supply chains in a systematic and cost-effective way.

In this study, SSCM is classified into the following: sustainable procurement, design, distribution, investment recovery, and social sustainability. The measures used for these components are outlined in the table below.

Table 2. 1 Publications from which sustainability practices were derived

	Measures	References
Sustainable design	Eco labelling of products	(González et al., 2008; Zhu et al., 2008; Sarkis et al., 2010; Gimenez et al., 2012; Esfahbodi et al., 2016; Paulraj et al., 2017)
	ISO 14001 certification	
	Use of environmental management systems	
	Cleaner productions	
	Design products for recycle	
	Design products to avoid use of hazardous materials	
	Design products for reduced consumption of energy	
Sustainable procurement	We select suppliers based on their social and environmental skills	
	We select suppliers based on their ability to support our social and environmental objectives	
	We select suppliers based on their ability to create environmentally friendly products	
	Environmental audit for supplier's internal management	
	Providing design specification to suppliers that include environmental requirements for purchased items.	
Investment recovery	Sale of excess inventories or materials	
	Sale of excess capital equipment	
	Sale of scraps	
	Sale of used materials or by-products	
Sustainable distribution	Cooperation with customers for using less energy during product transportation	
	Use of renewable energy in the process of products packaging	
	Use of renewable energy in any mode of products transportation	
	Cooperation with suppliers to reduce emissions during product transportation	
	Cooperation with suppliers to improve their waste reduction during product packaging	
Social sustainability	Employee skills development	
	Health and safety training for employees	
	Community investment	
	Sustainable working condition for employees	
	Protecting human rights	

2.6 Organisational drivers of SSCM

The scarcity of raw materials and destruction of the natural environment in recent years have led different stakeholder groups including shareholders, consumers, and government agencies to call for a more responsible way of industrial activities (Matos and Hall, 2007). As a result, firms are increasingly becoming responsible for their business activities by taking into consideration environmental, social and economic goals simultaneously (Hsu et al., 2013; Zhu et al., 2013; Heidary Dahooie et al., 2021). This increasing attention on environmental responsibilities have forced manufacturing companies to implement various sustainable initiatives within their supply chains, providing environmentally friendly products (Green et al., 2012; Luthra et al., 2015; Zhu et al., 2005) that have slightest effect on the environment, which is particularly important in the 21st century business environment where companies are involved in one and/or multiple supply chains (Matos and Hall, 2007; Yusuf et al., 2013; Mangla et al., 2014; Gardas et al., 2019; Heidary Dahooie et al., 2021).

In the existing literature, there are several factors that drive firms' adoption of SSCM practices, and these can be either external or internal to the firm (Seuring and Müller, 2008; Walker and Jones, 2012; Ahmad et al., 2017; Hong et al., 2022). While much of the literature suggests that firms' adoption of sustainable practices along their supply chains is mostly in response to government environmental regulations (Eltayeb et al., 2011; Zailani et al., 2012; Boström et al., 2015), recent studies reveal that regulations are crucial but not sufficient in SSCM implementation (Hsu et al., 2013; Ahmad et al., 2016; Paulraj et al., 2017; Hong et al., 2022). These studies argue that the external driving forces behind regulations can only promote the adoption of SSCM practices to a limited extent, requesting the organisation's internal commitment.

Therefore, even though this research acknowledges the effects of external forces on the adoption of SSCM practices, it mainly focuses on the internal factors that motivate firms to implement SSCM practices. In other words, instead of explaining the forces that pressurize business entities to be responsible in their operations, the current study seeks to clarify the benefits that firms could achieve through SSCM. Several studies (Luthra et al., 2016; Paulraj et al., 2017; Siems et al., 2021) have noted that proactive approach towards SSCM, which is mainly internally driven lead to better corporate image and ultimately result in improved competitiveness. Numerous internal factors

influence the adoption of sustainable practices, such as supportive organisational culture (Carter and Jennings, 2004; Pagell and Wu, 2009), business size (Hervani et al., 2005; Zhu et al., 2008), and top management commitment (Min and Galle, 2001; Walker et al., 2008). Thus, it is argued that a number of internal factors comprising organisational culture, business size, and quality of management will play an important role in SSCM implementation. Each of these organisational characteristics are discussed in the following section.

2.6.1 Organisational culture

Organisational culture is the collective basic beliefs, values, and behaviours of members of a particular organisation (Howard, 1998; Hofstede, 1981). From a holistic perspective, studies on the role of organizational culture in fostering or hindering the implementation of organisational innovations (Chandler et al., 2000; Cameron and Quinn, 2006; Jarnagin and Slocum, 2007; Hogan and Coote, 2014) have shown that organisational culture is one of the core reasons for the failure or success of implementing change programs in organisations. While the technology and initiatives may be in place, such innovations fail due to the fact that the underlying corporate culture remains as it is without any shift to accommodate change (Jarnagin and Slocum, 2007; Hogan and Coote, 2014).

In SCM context, corporate culture is a major driver of SSCM adoption in firms (Carter and Jennings, 2004; Cuthbertson, 2011; Walker and Jones, 2012; Hong et al., 2022). Implementation of SSCM philosophy is arguably stimulated by the decisions and actions of top management (Seuring and Müller, 2008; Pagell and Wu, 2009). Thus, scholars have argued that, in order to incorporate SSCM strategy into business processes effectively, firms must undergo substantial cultural transformation and change (Welford, 1995; Galpin et al., 2015). It is believed that a culture that supports sustainability decisions will motivate organisational members to take sustainability initiatives seriously. In other words, firms are required to integrate sustainability ideas into their daily routines and processes (Linnenluecke et al., 2009; Linnenluecke and Griffiths, 2010;Ramus and Marcus, 2017). The primary idea is that corporations must nurture a sustainability-oriented organizational culture to support their SSCM agenda (Linnenluecke and Griffiths, 2010).

Sustainability culture refers to a firm's recognition of the effects of its activities on the environment and the need to reduce it, which translates into values and beliefs that drive the decision-making process of the organisation (Marshall et al., 2015; Davis and Boulet, 2016). Values that embed

environmental and social issues are vital to nurturing sustainability cultures, which in turn, are reflected in the practices adopted (Pagell and Wu, 2009; Hong et al., 2022). Sustainability-oriented organisational culture promotes the adoption of proactive socially and environmentally responsible practices along the supply chain (Carter and Rogers, 2008; Wan Ahmad et al., 2016). Firms with sustainability cultures are often expected to implement SSCM practices beyond regulatory standards (Banerjee, 2002; Pagell and Wu, 2009; Galpin et al., 2015). Other scholars have demonstrated the role of sustainability culture in the application of green practices (Hu and Hsu, 2010; Hsu et al., 2013; Wu et al., 2016). This implies that successful SSCM implementation would depend largely on the values and ideological underpinnings of a company's culture (Linnenluecke et al., 2009; Gupta and Kumar, 2013; Marshall et al., 2015), and that these ultimately affect the benefits that can be achieved.

Firms that manage to achieve superior sustainability performance are entrenched with certain organisational norms and values, which describe their sustainability ethics, guide decision-making, and shape business models (Pagell and Wu, 2009; Hong et al., 2022). While organisational culture plays a crucial role in firms' implementation of sustainable practices on one hand, the type of SSCM strategy implemented is what determines improvement in sustainability performance on the other hand (Eccles et al., 2012; Gupta and Kumar, 2013; Marshall et al., 2015). Sustainability cultures emphasise taking into account economic, environmental, and social objectives simultaneously in the policy formulation process of firms (Pagell and Wu, 2009). Therefore, in order to achieve greater sustainability performance, firms must strive towards building a strong sustainability-oriented organizational culture. For instance, organisations could pursue a set of cultural characteristics that enable supportiveness, risk-taking and innovation, as well as aim at maximising long-term value through SSCM practices, rather than focusing on short-term economic benefits (Linnenluecke and Griffiths, 2010).

In the literature, many scholars have developed frameworks to classify major dimensions of organisational culture, providing a theoretical basis for the study of organisational cultures (Hofstede, 1996; Howard, 1998; Schein and Jossey-Bass, 2010; Cameron and Quinn, 2011). In this study, organisational culture is determined by sixteen (16) measures, which were adapted from (Wan Ahmad et al., 2016). These measures include the following:

- Innovative – The culture of innovation has an impact on the operational capacity of a firm. Innovation tends to thrive in flexible organisational cultures. Conversely, innovation is weighed down by rigid and unstable organisational cultures (Arad et al., 1997; Armstrong, 2010).
- Competitive – A competitive culture is associated with cost cutting and an emphasis on achieving efficiency in the short term. However, competitive cultures are known to drive innovation in organisations, especially when it is aligned with a differentiation strategy.
- Team-oriented – Firms that emphasises a spirit of teamwork and cooperation can capitalize on the individual strengths of their members. Team orientation is the extent to which the members of an organisation collaborate and cooperate in making decisions and accomplishing work goals.
- Supportive – Supportive culture is essential in the implementation of new initiatives such as SSCM practices. It is internally oriented and reinforced by a flexible organisational structure. Supportive culture entails expressing trust in and commitment to organisational members.
- Cohesive – Organisations that lay emphasis on the act of sticking together closely by members in order to improve productivity and thus achieve business goals.
- Flexible - A flexible culture is one where the organisation and its members are capable of adapting to changing demands effectively. This kind of culture supports innovation in organisations.
- Visionary – The degree to which decision-making by management is in line with the long-term organisational goals.
- People-oriented – The extent to which management decisions take into consideration the effect of decisions on members within the organisation.
- Structured – Structured corporate culture is an organisational model based on clearly defined organisational levels and structures.
- Formalized – Formalized corporate culture entails having a definite form or ritual of doing business.
- Predictable – Predictable corporate cultures can easily be imitated due to its lack of rareness and substitutability. Predictable cultures thrive in a more formalised work environment.

- Stable – The organisations that maintain a stable work environment are more likely to take implementation of new initiatives such as SSCM practices seriously. It takes consistency and leadership to maintain a truly stable corporate culture.
- Results-oriented – The extent to which organisations focus on outcomes or results rather than on processes and techniques employed to achieve these results.
- Goal-achiever – Goal achievers put emphasis on how to reach, achieve and realise their organisational goals.
- Opportunistic – This involves taking advantage of circumstances with little concern about the consequences on others.
- Risk-taker – The culture of risk-taking encourages personnel to take calculated risks. Risk-taking organisations communicate their support for teams or individuals who take planned risks in the interest of the organisation.

2.6.2 Business size

Business size is an important determinant of SSCM implementation by firms (Walker and Preuss, 2008; Zhu et al., 2008). The size of a firm is significant because of the role it plays in determining an organisation's capabilities (Mole et al., 2004). Organisational resources, such as human and monetary capital can be an estimate of organisational size (James, 1999). According to the resource-based view, larger corporations tend to have more financial resources and competences to address environmental concerns (Barney, 1991). In this regard, the role of organisational size in the implementation of SSCM practices is largely due to resource-based capabilities (Zhu et al., 2008). While larger corporations possess the required resources to undertake a bundle of socially and environmentally responsible initiatives to reduce their negative effects on the environment, smaller organisations can only afford to engage in specific environmental initiatives (Lenox et al., 2000; Sharma, 2000). This implies that the environmental initiatives that work for bigger firms might not be suitable for smaller firms because of their resource limitations (Pimenova and Van der Vorst, 2004).

Generally, larger firms encounter greater pressure to meet regulatory standards and improve their environmental performance (Russo and Fouts, 1997; Zhu et al., 2008). Thus, the adoption of SSCM practices by larger firms is mainly aimed at improving the performance of their supply

chains, as they rely on the resources along the chain to prosper. When a focal firm implement SSCM, other supply chain partners are expected to follow and adhere to the requirements for environmental and social standards imposed by the focal partner. In other words, smaller firms usually strive to meet the environmental requirements of the larger firms so that they continue to access resources along the supply chain (Zhu et al., 2008). The degree to which smaller organisations rely on the resources and knowledge of SSCM practices from their focal partners will determine their levels of SSCM implementation (Branzei and Vertinsky, 2003).

Remmen (2001) examined the level of environmental practices among SMEs, finding that despite the external pressures, their environmental practices are merely a compliance strategy. Del Brío and Junquera (2003) investigated the factors affecting the implementation of environmental innovations. The study found that the lack of environmental innovations among SMEs could be a consequence of many factors, such as limited financial resources, nature of organisational structure, and low abilities to obtain innovations. Their findings suggest that larger organisations have a higher tendency of implementing SSCM practices than smaller organisations (Del Brío and Junquera, 2003). In this respect, the resource-based theory can help in explaining the variations for organisations of different sizes in implementing SSCM practices (Zhu et al., 2008).

In extant literature on organisational innovations (Fink, 1998; Premkumar, 2003; Mole et al., 2004), business size has been measured mostly by four indicators: number of employees, annual turnover, number of office locations, and company's international reach. Therefore, these factors are adopted in this study to measure organisational size:

- Number of trained employees – The number of trained personnel is one of the commonly used metrics for the measurement of firm size. It offers insight on the available personnel, scale of business activities, and organisational operations.
- Annual turnover – Annual turnover is also one of the most common metrics for measuring firm size. It is the total revenue generated in a year.
- International reach – Globalisation has made firms to expand their supply chains to different continents or parts of the world. The extent of global outreach of a firm indicates the scale of its operations, size, and international impact.
- The number of office locations – This is another indicator of organisational size that gives an idea about the geographical spread of organisational operations.

2.6.3 Quality of Management

In defining the concept of quality of management (QOM), it is essential to state the meaning of "quality" and that of "management". Reeves and Bednar (1994) define quality as level of excellence, while Smircich and Morgan (1982) describes management as the effective and efficient coordination of organisational processes to achieve defined set of goals. The term QOM has been defined differently from different perspectives.

QOM is viewed as the extent to which an organisation is soundly run (Waddock and Graves, 1997). In a more elaborate definition, Koch and Cebula (1994) states that QOM encompasses management's ability to positively transform their organisation in order to continuously adapt to the ever-changing business environment. According to Doz and Prahalad (1998), QOM is concerned with influencing the individual behaviour of employees to create an effective organisational context. Given the lack of consensus on the definition of QOM among scholars, this study draws from the aforementioned definitions of "quality" and "management" and propose a more comprehensive definition of QOM concept: QOM is the degree of excellence in the coordination and organisation of business activities to achieve desired outcomes.

QOM is arguably coined from the notion of quality of government (QOG), which makes the former and the latter increasingly synonymous because governments are like businesses, and the focus is on providing the best services and products (Rodriguez-pose and Garcilazo, 2015). Nowadays, there has been an increasing attention on the impact of quality of institutions on service delivery (Hall and Jones, 1999). This is due to the role institutions play in economic development and public policy formulation (Coleman, 1988). Rodriguez-pose and Garcilazo (2015) contended that inefficient institutions are not only faced with the problem of poor productivity, but also, they lack the capacity to deliver effective services and policies. However, even though QOM and QOG are important determinants of organisational performance, the operations and SCM literature has overlooked the concepts. In light of this, the current study seeks to provide novel insight by investigating the relationships between QOM, sustainability practices, and performance outcomes in the oil and gas industry.

In SCM context, the globalisation of business activities and its negative effects on the ecosystem has triggered growing pressure for managers to enhance their social and environmental performance through implementing sustainability practices along their supply chains (Halldórsson

et al., 2009). This requires the commitment of top management, as it is their responsibility to ensure that such initiatives are supported by the main decision-makers in the organisation (Walker and Jones, 2012; Wittstruck and Teuteberg, 2012; Chacón Vargas et al., 2018). Ghoshal and Bartlett (1994) emphasised that organisational effectiveness often depends on the ability and willingness of managers to facilitate the success of initiatives in their organisations. In this regard, numerous studies (Seuring and Müller, 2008; Harms et al., 2013; Zhu et al., 2013) have stated that top management leadership, which is an attribute of QOM, is vital to the adoption of sustainable practices. Consequently, communication of a well-defined SSCM approach by top management will motivate employees to show more dedication towards achieving sustainability goals (Pagell and Wu, 2009; Wittstruck and Teuteberg, 2012).

In the business environment, firms' ability to develop and utilise resources depends on their capabilities (Rumelt et al., 1991). Organisational capabilities include all the management decisions and actions that a firm has taken over time (Porter, 1991). A number of scholars have noted that managerial actions and competencies are essential in the design and implementation of organisational policies (Ingraham and Donahue, 2000; Coggburn and Schneider, 2003) such as SSCM practices. Thus, managerial strength or capacity is an important driver of such initiatives (Mcguire et al., 1990). QOM involves extending the traditional focus of maximising economic benefits to include employee health and safety training, customer-oriented policies, and developing environmentally responsible products (Waddock and Graves, 1997; Rodríguez-Pose and Garcilazo, 2015).

Firms with perceived QOM engage in proactive environmental and social practices (Waddock and Graves, 1997), in order to lessen the effects of their business operations on the societies and communities in which they operate. More so, QOM is associated with quality of stakeholder relationships (Waddock and Graves, 1997). In other words, top management are expected to consider environmental, economic, and social objectives simultaneously in order to meet the concerns of multiple stakeholders. Therefore, the implementation of SSCM initiatives could be influenced by the QOM in an organisation. However, there is no empirical evidence to prove this. Hence, the need to explore the relationship between QOM and SSCM adoption by firms.

In extant literature, there are no specific metrics for measuring QOM. Consequently, the measures proposed by Ghoshal and Bartlett (1994) were adopted in this study and modified by the researcher

in order to capture important elements that constitute QOM. The identified measures include the following:

- Discipline – This essential organisational attribute that induces employees to strive towards meeting all expectations generated by their implicit or explicit commitments. Disciplined organisations have a clear standard of behaviour and performance, as well as consistency in the implementation of policies and initiatives.
- Experts in management team – This entails the extent to which a firm has experts in its management team. Competent managers, who ensure equity and fairness in the organisation's decision processes and business interactions with suppliers and customers, are likely to take SSCM practices seriously.
- Top management commitment – Top management commitment is crucial in the implementation of initiatives such as SSCM practices. It involves developing clear strategies and fostering a collective vision about the initiatives to be implemented. The success or failure or organisational innovations often depends on top management commitment, as it is their responsibility to create effective change programmes, which in turn, can lead to successful adoption of such innovations.
- General level of education - This involves organisational knowledge accumulation that boosts its collective ability to accept, make sense of, and respond to internal and external change. It also enables the gathering, processing, and interpretation of information, which will reduce uncertainty, enhance allocative ability, and contribute to effective decision-making aimed at improving performance in a firm.
- Sustainability-related training – Regardless of the size of an organisation, sustainability training is essential in the implementation of sustainable practices. It enhances the collective ability of an organisation to pursue realistic opportunities that sustainable practices offer, and to reward other people's actions aimed at achieving corporate sustainability.

2.6.4 Organisational theories and SSCM

Organisational theory refers to a management insight that helps describe or explain the behaviours, policies, and processes in organisations (Sarkis et al., 2011). The development of SSCM field requires novel knowledge to be generated thus, applying organisational theories provide an

excellent opportunity for the development of the concept (Sarkis et al., 2011; Ahmad et al., 2017). The application of organisational theory to environmental management (Etzion, 2007; Sharma, 2010; Shrivastava, 2011) and supply chain management has been addressed separately. However, few studies have attempted to incorporate organisational theories with SSCM (Sarkis et al., 2011; Ahmad et al., 2017). Consequently, this study attempts to link organisational theories and SSCM in order to help develop the field.

Extant literature on SSCM rely mostly on two streams of organisational theories. The first stream of theories namely, the Dynamic Capabilities View (DCV), Resource-based View (RBV), Practice-based View (PBV), and Natural Resource-based View (NRBV), are generally used by scholars in explaining the internal incentive of organisations towards SSCM adoption. While the DCV utilises dynamic viewpoint to explain companies' sustainable practices, the RBV, PBV, and NRBV are fixed in nature. The RBV, NRBV, and PBV explained firms' performance based on possession of resources and/or implementation of practices. That is, from a static point of view as they fail to consider the effect of market dynamism. Therefore, the DCV will shed light on firms' SSCM adoption from a dynamic perspective. On the other hand, the second stream comprises of Institutional theory and Stakeholder theory, which explain companies' implementation of SSCM strategies from an external viewpoint. Specifically, Institutional and Stakeholder theories put emphasis on the external factors that drive companies towards sustainability. A detailed overview of the aforementioned theories in the context of SSCM is presented in the next sections.

2.6.4.1 Resource-based View (RBV)

The RBV is arguably one of the most commonly used theories in operations management research (Hitt et al., 2016). The origin of RBV could be traced to the work of Penrose (1959). Thereafter, researchers have contended that an organisation's internal progress and external development by means of diversification and mergers are due to the way organisational resources are used (Kor and Mahoney, 2004; Newbert, 2007). Some scholars suggest that resources alone are of little use; the manner in which resources are utilised and made beneficial influences performance outcomes (Wernerfelt, 1984; Rubin, 2002). In light of this, the RBV has increasingly been utilised in explaining how valuable resources can offer improved competitiveness to firms (Barney, 1991). The central idea is that when a firm leverage on its internal resources to guard against external

factors that could influence performance negatively, this firm achieves a competitive edge over its rivals (Campbell and Park, 2017).

According to RBV, an organisation is a collection of capabilities, human and material resources (Rubin, 2002; Nath et al., 2010) and thus, firms must be assessed on the basis resource possession (Schoenherr, 2012). Resources encompasses all tangible and intangible factors that are controlled or owned by the organisation such as assets, attributes, capabilities, procedures, routines, and intellect (Barney, 1991). Although specific resources can be acquired, some could only be nurtured by firms (Lozano et al., 2015). When a firm possess resources that are valuable, rare, inimitable and non-substitutable (VRIN) simultaneously, it has the potentials of sustaining its competitive advantage in the long-term (Barney, 1991). Primarily, valuable resources assist in enhancing the efficiency of the organisation; rare resources are sources of competitive disparity; inimitable resources are unique and difficult for competitors to replicate; non-substitutable are those that has no strategic equivalence (Barney, 1991; Schoenherr, 2012). VRIN resources are generally implicit and intricate because they are mostly people-intensive and talent-based (Menguc and Ozanne, 2005).

Numerous studies (Darnall et al., 2008; Schoenherr, 2012; Sambasivan et al., 2013) have justified the integration of the RBV in SSCM context. In support of this assertion, Bansal (2005) highlighted three important points to link the RBV to sustainability. First, monetary investment is required for organisations to move towards SSCM. Secondly, empirical evidence has shown that sustainability can influence firm performance. Thirdly, new opportunities such as global reach, organisational slack, and capital management competencies could be built through shifts in strategies and technology from the adoption of sustainability (Bansal, 2005). Many scholars have used the RBV to describe the connection between environmental practices and firm performance (Darnall et al., 2008; Schoenherr, 2012; Sambasivan et al., 2013). Similarly, the RBV has also been used explain the influence of CSR on firms' economic performance (Torugsa et al., 2012). Thus, RBV acts as an optimum conceptual foundation for research on the perceived competitive impacts of SSCM practices.

2.6.4.2 Dynamic Capabilities View (DCV)

The DCV has been utilised in explaining social and environmental concerns from a dynamic perspective. Barney (1991) defines capability as an intangible type of resource. However, several

scholars have emphasised distinctiveness between capabilities and resources from a routine-based point of view (Peng et al., 2008; Wu et al., 2010). Based on their view, resources are organisational assets (human and material) that can be channelled towards beneficial use, while capabilities are organisational processes and procedures that employ a collection of resources to attain desired results. The notion of capabilities has been extensively explained by Teece et al. (1997). Historically, the DCV was developed from RBV. The RBV has received considerable criticisms for being 'static' and neglecting the effect of the dynamic business environment in various ways (Eisenhardt and Martin, 2000). This is because the RBV put emphasis on guarding and utilising current resources, neglecting how firms can generate additional resources and how the existing ones can be overhauled to fit new demands in the ever-changing business environment (Ambrosini and Bowman, 2009; Russo, 2009).

In the dynamic and competitive business environment, the actual source of competitiveness lies in a company's capability to adapt to changes consistently (Carmeli, 2004; Cepeda and Vera, 2007). Dynamic capabilities refer to a company's ability to integrate, build, and reconfigure capabilities to address changing needs in the market. It is believed that dynamic capabilities are shaped by the decisions taken by a firm over time and knowledge accumulation (Ambrosini et al., 2009).

In the context of SSCM, researchers are increasingly applying the DCV to explain firms' sustainability pursuit. Hofmann et al. (2012) found a positive link between organisation's dynamic capabilities (capacity for product innovation and adoption of new technology) sustainability practices. Wu et al. (2012) observed that organisations with greater capabilities are usually efficient in sensing shareholder desires, seizing SSCM opportunities to address changes in demands and optimise the current operational competencies in line with their sustainability pursuit.

There are two streams of research on dynamic capabilities. The first stream of studies focuses on the element of dynamic capabilities, while the second stream explores the influence of dynamic capabilities on organisational performance. In the first stream, the ability to sense, seize, and reconfigure are important organisational capabilities that helps in improving performance outcomes (Gebauer, 2011). Knowledge is one of the most significant antecedents of these elements of dynamic capabilities (Pavlou and El Sawy, 2011; Nieves and Haller, 2014). On the other hand, the second stream focuses on the influence of specific capabilities on performance. Karna et al. (2016) summarised the dynamic capabilities literature and classifies examples of dynamic

capabilities into six categories namely, R&D/innovation/technology, cooperation/alliance/external relations, knowledge management, intangible assets/reputation, strategic human capital management, and strategic decision making/market research.

2.6.4.3 Natural Resource-based View (NRBV)

The NRBV was developed to address the limitations of the RBV (Hart, 2011). The NRBV maintains that firms rely on the resources provided by the natural environment to thrive and progress (Wong et al., 2012). In this regard, companies must nurture the competencies to not only harness but also safeguard the natural resources in order to attain greater performance (Hart and Dowell, 2011). This requires integration of environmental considerations with a company's strategic planning processes, which improves the development of capabilities in the company (Chan, 2005). To achieve this purpose, firms need three major capabilities: pollution avoidance, sustainable processes and products, as well as sustainability-related training (Hart, 2011; Sambasivan et al., 2013).

Generally, the NRBV centres on the relationships between green capabilities, green practices, and competitiveness of business entities. The main idea is that firms need to focus on the long-term, rather than short-term gains, which will enable them to accrue the necessary capabilities and resources (Lee and Min, 2015). The NRBV relates to the environmental dimension of sustainability. According to the NRBV point of view, nurturing sustainability capabilities encourages organisations to move from the reactive environmental practices, to a more proactive approach addresses environmental issues significantly (Fraj et al., 2013; Li et al., 2016). From SSCM perspective on the other hand, the NRBV is fragmented as it fails to take into account the economic and social aspects of sustainability (Klassen and Vereecke, 2012).

2.6.4.4 Practice-based View (PBV)

In recent times, scholars have questioned the applicability of the RBV in operations management. Since much of the literature in this field attempt to explain the impact of adopting certain practices on organisational performance, Bromiley and Rau (2014) propose that the RBV is not suitable for explaining the difference in performance outcomes achieved by firms implementing the same practices. A practice is a bundle of activities that companies can apply in their processes (Bromiley and Rau, 2014). Unlike the main argument of the RBV, which suggest that an organisation's

competitive advantage emanates from the possession of the VRIN resources, the PBV holds that operational and management practices are not in any way valuable, rare, inimitable, or non-substitutable and their performance effects should not be viewed as sustained competitive advantage (Bromiley and Rau, 2014). Practices are openly available without any isolating mechanisms (Wu et al., 2010). Several studies have shown that the adoption of publicly available practices effectively, results in improvement in performance outcomes (Yang et al., 2011; Hajmohammad et al., 2013).

A review of fifty-five (55) empirical studies that employed the RBV perspective shows that 93% of the studies used performance as the dependent variable, while 7% used competitiveness as the outcome variable. From the PBV point of view, practices could account for variations in firms' performance (Bromiley and Rau, 2016). Thus, scholars should focus on explaining variations in performance between companies. In this study, the PBV is utilised as the theoretical basis for the direct relationships between SSCM practices and performance.

2.6.4.5 Institutional theory

Institutional theory explains the manner in which a firm's implementation of organisational practice is influenced by external institutional forces (Sarkis et al., 2011). Scholars have specified three types of mechanisms through which isomorphic change occurs: coercion, mimesis, and norms (DiMaggio and Powell, 2000). Firstly, coercive institutional pressures emanate from governmental regulations. This form of pressure is applied upon an organisation by government institutions (Lai et al., 2006; Sarkis et al., 2011). Governmental regulations are examples of coercive isomorphism. Secondly, mimetic institutional pressures stem from competitors of a firm. Due to uncertainty in the business environment, firms often imitate the successful paths of their rivals in order to create better opportunities (DiMaggio and Powell, 2000; Sarkis et al., 2011). Thirdly, normative pressures come from professionalization such as level of standards in the market or sector, which force firms to implement particular practices (DiMaggio and Powell, 2000; Lai et al., 2006).

Institutional theory has become very popular in SSCM studies. Institutional factors have significant influence on firms' implementation of sustainable practices (Bansal, 2005). The trio of coercive, normative, and mimetic pressures are pushing companies to attain their various goals of SSCM (Zhu et al., 2012). Some researchers have examined the application of GSCM practices by

Chinese companies, noting that the implementation of such practices is mainly driven by institutional factors (Zhu et al., 2013).

2.6.4.6 Stakeholder theory

The stakeholder theory posits that organisations thrive and generate proceeds by fulfilling the needs of various stakeholders (Clement, 2005). Stakeholders are individuals or sets of people that have a genuine interests in firms' processes and activities (Jacobs and Getz, 2011). Primarily, stakeholders comprise employees, shareholders, suppliers, consumers, governments, non-governmental associations, communities, and media groups (Clement, 2005; Donaldson and Preston, 2011). Thus, firms must strive towards satisfying different stakeholder interests. This is especially relevant for the adoption of sustainable practices because firms need to consider the requirements of different stakeholder groups equally (Garvare and Isaksson, 2001; Todorut, 2012; Seuring and Gold, 2013).

Stakeholder pressure is a major driver of SSCM adoption (Seuring and Müller, 2008). It is believed that corporations can improve their bottom line through effective management of stakeholder concerns (Wagner, 2005; Luthra et al., 2016; Paulraj et al., 2017). In this respect, stakeholder pressure and firms' implementation of SSCM practices are positively connected (Céspedes-Lorente et al., 2003; Darnall et al., 2010; Garcés-Ayerbe et al., 2012). Indeed, stakeholder pressure, regulations and potential gains affects the adoption of sustainable production strategies and organisational performance (Adebambo et al., 2013). Specifically, factors that drive sustainability practices include government legislations, pressure from customers, and the negative effect of damaging the ecosystem (Pun, 2006).

Overall, the review of organisational theories used in explaining the driving forces behind the adoption of sustainable strategies by organisations reveal that, while some firms adopt SSCM initiatives due to external pressures, others engage in sustainable practice in an attempt to improve their reputation and competitiveness (Pagell and Wu, 2009; Seuring, 2013; Schaltegger and Burritt, 2014). In view of the aforementioned evidence, it is important for firms to embrace a proactive approach towards enhancing the performance of their supply chains, rather than a reactive approach of regulatory compliance (Vachon and Mao, 2008).

In this study, both institutional theory and stakeholder theory will not be tested or validated because they have been extensively studied in SSCM context (Darnall et al., 2010; Zhu et al., 2012) with consistent findings. These theories were discussed in this chapter to enhance our understanding of the theoretical foundations of SSCM research. The stakeholder theory, institutional theory, and RBV mutually provide an all-encompassing theoretical framework for sustainability (Wagner, 2015). However, since the aim of this research is to investigate the connection between firms' characteristics and SSCM adoption, only the RBV, DCV, and PBV will be verified in this study.

2.7 Performance outcomes of SSCM

Having highlighted the factors that drive companies' adoption of sustainable practices, this section moves on to discuss the benefits derivable from SSCM adoption. Essentially, it aims to highlight the performance outcomes related to the adoption of proactive sustainable strategies, which is the final step in answering the research questions. This creates a necessity to address SSCM performance outcomes and develop appropriate dimensions to measure SSCM performance. Hence, contributing to the conceptual framework development, as the section covers firm performance. While the triple bottom line (TBL) concept is increasingly used by scholars to measure sustainability performance, Luthra et al. (2016) argues that the TBL elements fail to consider operational indicators and thus limiting its effectiveness in SCM context. Therefore, this study builds on the TBL principles and incorporate operational dimension in order to capture all the expected performance outcomes of SSCM implementation, as suggested by Luthra et al. (2016).

2.7.1 Triple bottom line (TBL)

According to Elkington (1998), firms' performance is generally within triple pillars comprising economic, environmental and social bottom lines. The TBL framework seeks to take into consideration these three aspects concurrently and try to balance the performances related to these dimensions (Carter and Rogers, 2008; Slaper and Hall, 2011; Elkington, 2013). In existing literature, SSCM performance implications have been assessed using the TBL concept, addressing

economic, social, and environmental goals in the business context (Hopwood et al., 2005; Korže, 2018).

The philosophy behind the TBL framework is that the ultimate success of a firm must be assessed not only in terms of its economic value, but also in terms of environmental and social behaviours (Gimenez et al., 2012). Having said that, the lasting success of business entities depend on their capability to manage economic, social, and environmental issues effectively (Yusuf et al., 2013; Gardas et al., 2019). Generally, the TBL helps in monitoring progress towards improving the performance of corporations in environmental, economic, and social aspects (Carter and Easton, 2011). This suggest that there exists a bundle of practices that can have positive impacts on these three elements simultaneously and thus enhance the overall performance of business organisations. The TBL concept and its main performance pillars are illustrated in figure 2.5.

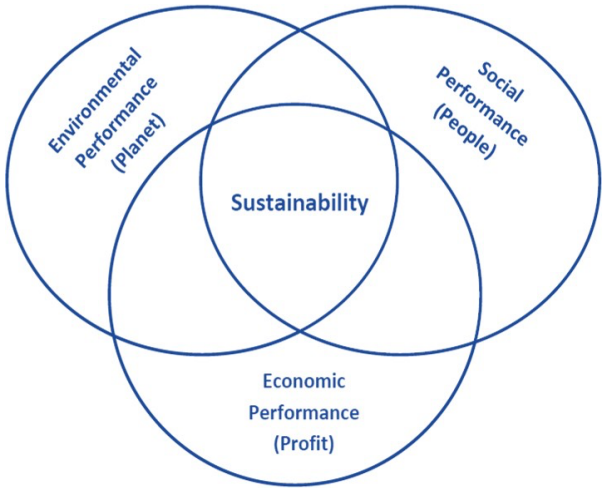

Figure 2. 5: TBL framework (Carter and Rogers, 2008)

The TBL is a comprehensive way of managing the overall responsibilities of an organisation, measuring and reporting corporate performance (Elkington, 1998; Livesey and Kearins, 2002; Pullman et al., 2009). Although it is apparent that firms are required to extend their performance assessment beyond economic gains to include social equity and environmental protection, there is a lack of detailed procedures on how to achieve that (Elkington, 1998). Consequently, it is essential for firms to create, capture, and apply sustainability-related knowledge in dealing with

opportunities and challenges related to meeting the TBL elements of which sustainability is to be measured (Jamali, 2006; T. F. Slaper and Hall, 2011; Milne and Gray, 2013).

Numerous organisations are increasingly adopting the TBL framework to measure their sustainability performance in order to ensure long-term survival and competitiveness (Hollos et al., 2012). The economic aspect of the TBL pursues traditional economic goals while embracing social and environmental consequences (Govindan et al., 2013). The social aspect of the TBL is concerned with the ethical behaviour related to a firm's activities. It emphasises the need for firms to operate in a way that is reasonable to both the work force and society as a whole (Carter and Easton, 2011). The environmental aspect of the TBL seeks to improve the condition of the natural environment by minimising the negative impacts of business activities on the ecosystem (Gimenez et al., 2012; Lai et al., 2013; Tseng et al., 2015).

In spite of the growing acceptance of TBL framework in measuring sustainability performance, many researchers have questioned the validity of the framework, asserting that it is difficult to assess sustainability performance accurately in some of the fields using the TBL framework (Hubbard, 2009; Milne and Gray, 2013). It has been contended that the TBL is an incomplete framework that has increasingly become synonymous with sustainable development, as a considerable amount of sustainability literature refer to the TBL not as a performance measurement tool, but as a representation of the dimensions of sustainability (Milne and Gray, 2013). The confusion in the meaning of TBL has made organizations to believe that they can achieve sustainability by simply managing the TBL dimensions (Norman and MacDonald, 2004; Richardson, 2013). While some scholars have criticized the TBL, others are increasingly adopting it in assessing the sustainability performance of firms (Silvius and Schipper, 2014b).

Overall, the TBL framework systematically take into account economic, social and environmental goals simultaneously, and strive towards ensuring a balance among these performance bottom lines in order to create a win-win situation for all parties. Indeed, this is consistent with the notion of SSCM, which integrates social and environmental issues with financial objectives to reduce the negative impacts related to a company's supply chain and achieve environmental protection, social equity, and economic prosperity (Carter and Easton, 2011). (Young and Tilley, 2006). The pillars of TBL including economic, environmental and social dimensions are mutually supportive of each other (Vachon and Mao, 2008). Thus, it is argued that the employed SSCM philosophy is in line

with Elkington (1998) TBL framework. The TBL framework is generally used in measuring sustainability performance.

2.7.2 SSCM performance measures

In the highly competitive business environment, organisations must be able to measure their overall performance and identify areas that require improvement in order to maintain long-term survival (Kaplan and Norton, 2000). On one hand, firm performance refers to the accumulated end-results of all the organisation's processes and activities (Walker and Brewer, 2009; Robbins and Coulter, 2012). On the other hand, performance measurement refers to the quantification of end-results derived from the decisions and activities taken by management over time (Slack and Johnston, 2007; Slack, 2017).

The traditional performance measurement is deemed not suitable in a SSCM context because it is primarily related to financial value assessment (Kaplan and Norton, 2001). In SSCM context, performance measurement is somewhat new. This offers an excellent opportunity for business entities to measure performance outcomes when they implement SSCM initiatives (Shi et al., 2012). As advocated by the proponents of the TBL concept, the performance measurement of SSCM must go beyond the economic bottom line. In other words, it must simultaneously consider the environmental, economic, and social bottom lines of the organisation (Elkington, 2013).

In assessing the performance outcomes of SSCM, firms must measure economic performance alongside environmental performance and social performance. Effective assessment of the performance implications of implementing SSCM practices necessitates extending the traditional measurements to include the core aspects of the TBL, as they are mutually supportive of one another (Hervani et al., 2005; Yusuf et al., 2013). This create a need for reliable, effective, and complete set of sustainability indicators (Shi et al., 2012). Thus, it is argued that the performance measurement of SSCM could be developed by building upon the conventional performance measurement in SCM and incorporating some key indicators of sustainability.

Organisations generally assume that they can use various practical approaches to develop indicators for the measurement of their economic, environmental, and social performance. Nevertheless, the variety of options that organisations may embrace in developing such indicators depend on many factors, including the organisation's economic bottom line and possession of the

required resources for undertaking the activity (Schaltegger and Burritt, 2014). In this regard, a wide range of indicators, indices and benchmarks are being provided by the United Nations, which can be adopted in measuring sustainability performance (Bell and Morse, 2008). Primarily, the aim of providing such universal indicators of sustainability is to improve the natural environment, manufacturing activities and consumption patterns (Bell and Morse, 2008).

There seems to be a consensus among researchers on the need to extend the traditional performance measurement beyond financial bottom line and include all other critical factors influencing the success or failure of business entities (Kaplan and Norton, 2001). Several studies recommend that, when developing indicators of sustainability performance, it is vital to evaluate all the key factors that matter to the firm, employees, stakeholders, and community (Sarkis, 2001; Schaltegger and Burritt, 2014; Luthra et al., 2016). In view of this, a number of researchers have suggested various indicators for the measurement of SSCM performance using the indices and metrics of sustainability developed by the United Nations, which comprises economic, social, and environmental aspects (Sarkis, 2001; Esty and Winston, 2006; Zhu et al., 2008a).

2.7.3 SSCM performance dimensions

In existing studies on SSCM, researchers often describe the performance outcomes of implementing sustainable practices within the supply chain context as SSCM performance (Laosirihongthong et al., 2013; Schaltegger and Burritt, 2014). As mentioned earlier in the preceding section (2.7), the TBL framework is the most popular tool for assessing SSCM performance. However, the TBL framework fail to consider operational indicators and thus limiting its effectiveness in SCM context, where operational performance is a vital source of competitive edge. Therefore, this research builds on the TBL performance pillars and incorporates operational performance pillar in order to capture all the expected performance outcomes of SSCM implementation, as suggested by Luthra et al. (2016). Hence, the SSCM-related economic, social, environmental, and operational performance outcomes are discussed in the subsequent sub-sections. Additionally, the position of scholars on these four performance dimensions is discussed below.

2.7.3.1 Economic performance

Numerous studies on the link between SSCM implementation and economic performance (Rao and Holt, 2005; Mahoney and Roberts, 2007; Zhu et al., 2007; Wagner and Blom, 2011; Parast and Adams, 2012) have been conducted, with inconclusive findings. While some studies found positive association (Wagner and Blom, 2011; Paulraj et al., 2017), others identified negative linkages (Mahoney and Roberts, 2007; Parast and Adams, 2012). Hence, there is much confusion in the literature on the connection between the adoption of sustainable practices and economic performance, unlike that of the links between SSCM implementation and environmental performance. Despite the pressure for environmentally friendly production processes, business entities should consider the effects of social and environmental practices on their economic viability (Elliot, 2011; Gopalakrishnan et al., 2012).

The application of SSCM practices in supply chains can enhance the economic performance of firms (Zhu and Sarkis, 2004; Gyula, 2013; Yusuf et al., 2013). Undertaking environmental practices improves corporate image and customer satisfaction, which ultimately translate into economic gains (Rao and Holt, 2005). Organisations with a good reputation can achieve financial benefits through attracting more investment (Zailani et al., 2012; Virakul, 2015). Environmentally friendly production offers many competitive opportunities including internal performance and external market gains (Savitz and Weber, 2014; Maletič et al., 2015; Epstein et al., 2017).

Much of the literature on SSCM has maintained that companies could benefit from greening their supply chains in terms of productivity, cost saving, and innovativeness (Walker et al., 2008; Eltayeb et al., 2011; Seuring, 2013). SSCM enable organisations to meet varying consumer requests for environmentally friendly goods, reduce risk, and increase the level of trust among supply chain partners, leading to customer loyalty, better relationships with suppliers, and economic profitability (Gyula, 2013; Li et al., 2016).

In contrast, a number of studies found a negative correlation between sustainable practices and economic performance (Mahoney and Roberts, 2007; Parast and Adams, 2012). These studies suggested that the increased cost associated with adopting SSCM initiatives lead to competitive disadvantage at the beginning of the implementation, which affects the financial bottom line. Rao and Holt (2005) and Bowen et al. (2006) stressed that the impact of implementing sustainable practices on the economic performance of firms is achieved in the long-term and not within a short-

term period. In light of this, recent studies (Clarkson et al., 2011; Hollos et al., 2012; Dixon-Fowler et al., 2013; Gardas et al., 2019) have begun to question the existing literature on SSCM in terms of whether adopting SSCM practices would eventually provide economic benefits, which is the main priority for most business organisations. However, a considerable amount of the literature appears to be in support of a positive relationship between economic performance and SSCM practices (Yang et al., 2011; Wagner, 2015; Esfahbodi et al., 2016; Paulraj et al., 2017; Wagner, 2005). The uncertainties about the effects of SSCM practices on economic profitability create a need for more empirical investigation. Thus, it is argued that in spite of the current findings in the literature, further empirical evidence is required to clarify the ambiguity surrounding the impacts of implementing SSCM on economic performance.

2.7.3.2 Social performance

The implementation of SSCM practices improves the social performance of business organisations (Jamali, 2006; Gimenez et al., 2012; Savitz and Weber, 2014). Several studies have shown that SSCM implementation is associated with improvements in health and safety (Fernández-Muñiz et al., 2009; Sarkis et al., 2010), work conditions (Yusuf et al., 2013; Esfahbodi et al., 2016), living conditions (Pullman et al., 2009; Luthra et al., 2015), and employee development (Faisal, 2010). In essence, SSCM enable firms to enhance employee health and safety, education, skills, and the general societal wellbeing, and wealth creation potential (Caulfield et al., 2006; Dempsey et al., 2011).

Investments in SSCM initiatives are not necessarily associated with economic benefits. Other intangible aspects such as customer satisfaction, employee job satisfaction, employee engagement, community developments, firms' reputation, and reduced health and safety risks are relevant to organizations but are more difficult to quantify in terms of monetary value (Savitz and Weber, 2014). By undertaking SSCM initiatives, firms can enhance their employee motivation and quality of life, which in turn can improve both social and economic performance through enhanced productivity (Hutchins and Sutherland, 2008; Lee and Wu, 2014). Therefore, improvements in social performance through sustainable practices generally have direct impact on the environmental and financial performance of companies.

2.7.3.3 Environmental performance

Generally, the position of extant literature on the relationship between SSCM implementation and environmental performance has been well established. Numerous empirical and non-empirical studies (Seuring and Müller, 2008; Zhu and Sarkis, 2007; Luthra et al., 2016; Gardas et al., 2019) have shown that the application of sustainable practices within the supply chain will enhance the environmental performance of firms. Vachon and Klassen (2008) conducted a study to ascertain the effects of sustainability initiatives on companies' environmental performance, noting that close collaboration with members of the supply chain in the development of sustainable initiatives provides environmental benefits in the manufacturing context. Luthra et al. (2016) observed that, undertaking environmental initiatives along the supply chain offers improvements in environmental bottom line through reducing the negative impacts associated with product life cycle. Firms could gain from greening their organisational processes in terms of environmental innovation and inter-organisational collaboration to provide products with the least negative environmental impacts (Wong et al., 2012; Lai et al., 2013). Establishing strong relationships with suppliers can promote recycling activities (Eltayeb et al., 2011). Hence, incorporating SSCM initiatives into a firm's production processes will enhance its environmental performance (Mangla et al., 2014).

As the pressure for more environmentally and socially responsible practices intensifies, which is aimed at protecting the natural environment and minimising resources consumption, improvement in environmental performance remains a critical issue for manufacturing companies (de Giovanni, 2012). Consequently, corporations are increasingly adopting SSCM practices to mitigate the impacts of their supply chains on the environment (Wagner, 2005; Li et al., 2016; Paulraj et al., 2017). SSCM implementation can improve various processes in supply chains (Seuring and Müller, 2008).

Major benefits of SSCM include reduction in prices of raw materials and packaging due to recycling opportunities (Zhu et al., 2007; Eltayeb et al., 2011), reduction in environmental risks (Srivastava, 2007; McWilliams and Siegel, 2011), reduction in resource use (Wagner, 2010; Gyula, 2013), and improvements in quality of products and processes (Sarkis et al., 2010). It has been contended that firms engaging in proactive environmental practices are willing to go extra mile to enhance their environmental performance (Rao and Holt, 2005). Environmental performance is primarily concerned with reduction of waste, pollution, hazardous substances,

emissions, and appropriate waste disposal (Wagner and Blom, 2011; Harms et al., 2013; Schaltegger and Burritt, 2014).

2.7.3.4 Operational performance

The link between SSCM practices and operational performance of firms has been found to be positive (Eltayeb et al., 2011; Yusuf et al., 2013). A considerable number of scholars have observed that the application of green practices within the supply chain improves the operational performance of both the focal firm and its suppliers (Rao and Holt, 2005; Zhu et al., 2008; Luthra et al., 2016). Some of the benefits of SSCM implementation identified in the literature include improvements in quality of products and processes (Sarkis et al., 2010), improvements in flexibility and delivery (Zhu and Sarkis, 2004; Gopalakrishnan et al., 2012), increased efficiency (Gunasekaran and Spalanzani, 2012), and savings in production costs due to the use of energy efficient technologies (Luthra et al., 2016). Other benefits derivable from the implementation of SSCM practices within the supply chain are enhancements in innovation (Hasan et al., 2012; Yusuf et al., 2013), and increase in the volume of sales (Zhu et al., 2007; Hasan et al., 2012).

In today's business environment, where firms compete based on supply chain capabilities, improving operational performance through the implementation of sustainable initiatives in supply chains is deemed a necessary antecedent to competitive advantage (Vokurka et al., 2002; Hasan, 2013). Competitive advantage is an organisational state of optimum performance that occurs when a company effectively compete on either price or differentiation strategies, which can be attained through higher quality, lower cost, innovation, proactivity, flexibility and delivery speed (Pitelis, 2009). Companies that reduce negative environmental impacts of their supply chains through engaging in recycling activities, will displace their competitors that fail to undertake such initiatives and thus achieve competitive advantage (Gopalakrishnan et al., 2012; Zailani et al., 2012; Hsu et al., 2013). In this respect, organisations must strive towards developing green strategies that will enable them to sustain their competitiveness (Eltayeb et al., 2011; Yusuf et al., 2013), as effective management of ecological and social issues can enhance the operational performance of companies.

Accordingly, the performance outcomes of SSCM identified in extant literature were classified into four categories (economic, environmental, social, and operational outcomes) in this study, as recommended by Luthra et al. (2016). This will enable the researcher to capture the dimensionality

of organisational performance. The indicators used to measure organisational performance are outlined in the table below.

Table 2. 2: Publications from which organisational performance measures were derived

Outcomes	Measures	References
Economic performance	Net profit	(Chen et al., 2004; Ameer and Othman, 2012; Delen et al., 2013; Gyula, 2013)
	Return on sales	
	Return on investment	
	Market shares	
	Improvement in firm's image	
	Decrease in cost of materials purchased	
Social performance	Improved employee health and safety	(Brammer et al., 2006; Carter and Rogers, 2008; Wood, 2010)
	Improved stakeholder welfare	
	Improved community investment	
	Reduced environmental impact to the public	
	Improved community health and safety	
Environmental performance	Reduced wastewater	(Zhu and Sarkis, 2004; Zhu et al., 2007; de Giovanni, 2012; Mangla et al., 2014)
	Carbon footprint reduction	
	Reduced air pollution	
	Reduction of energy used	
	Reduction of water used	
	Reduction of solid waste	
	Decreased use of hazardous materials	
Operational performance	Proactivity	(Perera et al., 1997; Wouters et al., 2002; Ahmad and Zabri, 2016)
	Innovation	
	Flexibility	
	Speed	
	Low costs	
	Quality	

2.8 Overview of Oil and Gas Industry

The oil and gas (O&G) industry has undergone several evolutionary stages, starting from low to mass production based on market demand, then to lean production, agile production, and sustainable production in recent times (Garbie, 2011). The industry plays a crucial role in economic and social endeavours across the globe through providing the required products to sustain universal energy demand (Lakhal et al., 2007; Ahmad et al., 2017). Primarily, the day to day activities of the world depends on oil supplies and thus, no modern society can live without O&G products (Briggs et al., 2012). The petroleum industry serves as a foundation for the

functioning of multiple industries, as its products are used in operating machines for commercial purposes and domestic use (Hussain, 2006). On the other hand, the increasing dependence on O&G products in the world has made its cost of production one of the uppermost. Increases in the price of O&G products often affect the prices of other goods in the market (Schmidt, 2015). Hence the need for cost regulation, sustainable production and sustainable distribution in the industry.

From its upstream to downstream ends, the industry comprises of a complex network of entities (Chima, 2007). It is made up of numerous players with different access to resources, technology, expertise, and end users (Edwards et al., 2010). Key players in the industry are classified as operators (oil enterprises), contractors, subcontractors, and suppliers (Yusuf et al., 2014). In spite of the fact that the industry is generally seen as one industry, it encompasses enterprises from various settings that symbolise different organisational cultures and specialization (Chima, 2007; Yusuf et al., 2014). Every firm within the industry belongs to different supply network (Surana et al., 2005). Consequently, understanding the network requires a close look at each of the enterprises, because every firm is functioning in its specific background and participates in the supply chain through its unique policy-making procedure (Surana et al., 2005). Since O&G enterprises originated from various countries, their historical roots may influence their commitment to SSCM practices, corporate structure and values (Yusuf et al., 2013). While the petroleum industry is needed to satisfy global energy demand, its activities cause considerable environmental damage. The industry is faced with extreme pressure to function in a more responsible manner in order to minimize the negative impacts of its activities (Wan Ahmad et al., 2017). By incorporating sustainability practices across the O&G supply chain, firms can reduce their negative environmental impacts (Gardas et al., 2019).

2.8.1 Oil and Gas Supply Chain

O&G supply chain comprises of activities such as local and transnational transportation, inventory management, order processing, information flow, products sorting, as well as facilitation of importation and exportation (Chima, 2007). The processes within the petroleum supply chain are similar to the gas supply chain. They both comprises activities in oil/gas fields, oil/gas separation plants, primary storage facilities, refining hub, and facilities for storage at secondary level (Yusuf et al., 2014).

Although the O&G supply chain is often comparable with the supply chain of other industries, it differs in a number of ways due to the nature of its activities and processes such as the transformation of crude oil to refined products and distribution of products to petrol stations (Yusuf et al., 2014). There is also a distinction amongst petroleum supply chain and that of high or low volume commodities in terms of upstream method of coordination during crude extraction (Briggs et al., 2012). The upstream sector is particularly more complex than that of other manufacturing industries (Briggs et al., 2012). The structure of the upstream section is unique compared to that of other manufacturing supply chains; because it begins with extraction activities, which extends to different means of logistical activities (Garbie, 2011).

In addition, the continuously changing nature of the supply chain poses numerous complexities for efficient synchronisation of processes. Therefore, in order to achieve greater system coordination and successful flow of materials and information, supply chain partners must integrate and avoid competing as independent members (Yusuf et al., 2013). Optimal planning of production activities in the petroleum industry is vital for the successful coordination of the O&G supply chain. Nevertheless, achieving such optimization is seen as one of the most significant and challenging tasks for managers and practitioners. Therefore, operators within the industry should adopt appropriate SCM techniques in order to optimize and integrate the overall supply chain (Neiro and Pinto, 2004; Chima, 2007). Primarily, the O&G supply chain is made up of three major segments: the upstream, midstream, and downstream sectors. Firstly, the upstream involves exploration and production activities. Secondly, the midstream is the distribution stage, involving pipelines and trucks that transport crude substance to the refineries. Thirdly, the downstream includes marketing and retail distribution through petrol stations (Briggs et al., 2012). Figure 2.5 illustrates the O&G supply chain, its processes, and industry segments.

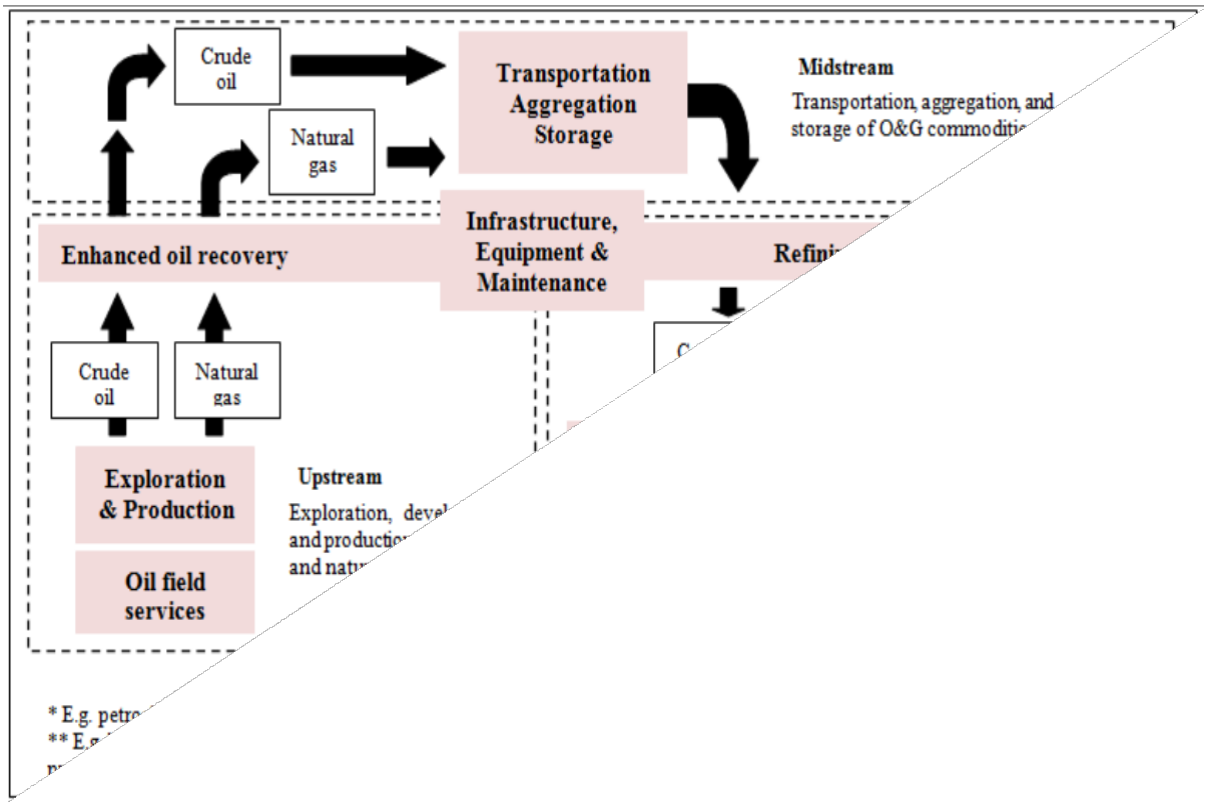

Figure 2. 6: O&G supply chain (Kilponen, 2010).

2.8.1.1 Upstream Oil and Gas Supply Chain

The upstream sector in the O&G supply chain encompasses exploration, retrieval, and production of crude substances (Neiro and Pinto, 2004; Weijermars, 2010). Petroleum industry upstream activities are mainly categorised into exploration and production. On one hand, the exploration includes seismic and geological, magnetic, electrical and gravity operations, which are concerned with locating potential underground or underwater crude oil. In doing so, once a certain required geological structure has been identified, that is the presence of hydrocarbons, thickness and internal pressure of a reservoir, the next step is to start drilling exploratory boreholes (Chima, 2007). On the other hand, production in the petroleum industry refers to the development of the crude substances from the basin through drilling. Its operations involves production and facilities engineering in order to produce crude oil products (Chima, 2007).

The main objective of upstream activities is to generate huge amounts of crude substance across the supply chain. Most of the activities in exploration and production are repetitive and costly (Briggs et al., 2012). In this stage, several factors, such as environmental regulations and deployment of new technologies must be taken into consideration (Elcock, 2007). Hence, exploration and extraction activities require a considerable amount of investments and up-to-date technologies to optimise overall organisational processes (Weijermars, 2010).

2.8.1.2 Midstream Oil and Gas Supply Chain

Midstream is the second stage in O&G supply chain, which is concerned with the distribution system, comprising marine vessels and pipelines that conveys crude oil and petroleum products to different refineries and storage facilities around the world (Chima, 2007; Briggs et al., 2012). The midstream, in most cases, is considered a part of the upstream sector. Midstream section is where the transformation of products at refineries occurs (Weijermars, 2010). While oil storage tanks are mostly stored in a cylindrical shape, gas tanks are usually in a spherical shape. Midstream covers all the logistics in petroleum industry, including direct crude transportation to refineries, or crude export to other countries using ships and oil vessels. Petroleum products are transported in different ways, ranging from ocean shipping, barges, railways, pipelines, to tankers. Some of these modes of transporting crude oil products attract higher costs. This cost varies depending on the situation, location, as well as the quality of crude oil (Briggs et al., 2012).

2.8.1.3 Downstream Oil and Gas Supply Chain

The downstream sector is the third stage in O&G supply chain, which encompasses marketing and delivery of products including fuel, diesel, and kerosene. Distribution of O&G products is carried out through storage facilities and different transportation modes and routes (Julka et al., 2002; Neiro and Pinto, 2004). Operators in the industry engage in various activities to ensure a smooth movement of commodities from refineries to the point of consumption (Gardas et al., 2019). On the other hand, marketing in petroleum downstream refers to the direct sale of commodities to consumers (De Avila Arroyo et al., 2014).

In the wholesale segment, logistical activities involve the movement of petroleum commodities to depots and stations, through different modes of transportation, including rail, road, marine, and pipelines. It is carried out by oil tankers and through pipelines in particular circumstances, for

example, distribution of airplane fuel to airports. Petrol stations, factories, warehouses, and airports need O&G products, in order to meet high demand for the products, especially being the major source of energy (Chima, 2007).

2.8.2 SSCM in Oil and Gas Industry

The notion of SSCM in the O&G industry is the systematic balancing of environmental, financial, and social goals (Gardas et al., 2019; Beiranvand and Dorniani, 2022; Olugu et al., 2022). O&G activities have considerably negative impacts on the environment, society, and health condition of both employees and the public. In most cases, the processes involved in exploration, refining and logistical activities of O&G products cause pollution, emissions of greenhouse gases (GHG), and ecological degradation. In this regard, the host communities are directly affected by the release of toxic substances, environmental pollution, air pollution, and water pollution (Ahmad et al., 2017).

The O&G industry is generally seen as the leading polluting industry across the globe (Yusuf et al., 2013). Thus, its sustainability is a global concern that must be solved so that the risks involved are minimised or eliminated. One way to realise this is by the incorporation of SSCM approach in the industry's supply chain (Wan Ahmad et al., 2016; Beiranvand and Dorniani, 2022; Olugu et al., 2022), which could improve the effectiveness of exploration, production, distribution, and minimize oil spills, flaring, accidents, and boost the economic strength of the oil companies (Gardas et al., 2019).

The end-to-end activities of the petroleum industry are very harmful to the environmental and public health and safety. Hence the need to minimise or eliminate the chances of accidents to arise. The Deepwater Horizon incident that occurred in 2010 is one of the major incidents that shows the gravity of petroleum industry related accident. Similarly, the event exposed the absence of effective regulatory frameworks and guidelines regarding environmental, health and safety protection within the offshore segment of the industry (Lin-Hi and Blumberg, 2011). A number of scholars have observed that regulatory pressure is crucial in encouraging the implementation of SSCM practices across industrial supply chains (Wu et al., 2012; Zhu et al., 2012). Environmental regulations promote innovation in the O&G sector (Ford et al., 2014). However, regulatory pressure can also hamper new environmental initiatives by reducing their usefulness and worth (Grekova et al., 2014). Many oil firms function in multiple countries and thus encounter various

sorts of regulations, which sometimes overlap, result in delays in operations, and cause additional expenses (Harris and Khare, 2002; Wagner and Armstrong, 2010).

Indeed, the O&G industry is an international industry, as it operates a supply chain that transcends different geographical boundaries. For example, an American firm can be developing oil reserves in Africa that would eventually be shipped to Europe for consumption. In doing so, the numerous regulations firms encounter can trigger uncertainties to their supply chains (Wan Ahmad et al., 2017). In this respect, inter-organisational integration and collaboration across the supply chain will help in reducing regulatory risks (Zhu et al., 2010; Wu et al., 2012; Yusuf et al., 2013). Engaging in sustainable procurement initiatives that considers sustainability-related requirements of other organisational processes such as production and transportation can also help firms to mitigate such risks. Another way of minimising the risks is that of using environmental management systems that enable focal firms to assess the environmental performance of their suppliers (Darnall et al., 2008; Olugu et al., 2022). Several researchers (Matos and Hall, 2007; Frynas, 2009; Gardas et al., 2019) have emphasised the significance of adopting environmental practices in the petroleum industry.

Firms' capability to react to changes in the market in a flexible way that enable them to manage social and ecological issues often relies on the quality of the relationship with stakeholders (Wan Ahmad et al., 2017). Firms that possess adequate internal capabilities and resources would be able to address the environmental pressure from the various stakeholder groups (Wan Ahmad et al., 2016). Companies must therefore strive towards creating strong mutually beneficial relationships with stakeholders, which will enable them to understand the expectations of multiple stakeholders (Yusuf et al., 2013; Gardas et al., 2019).

With regard to the activities of the petroleum industry, issues that stakeholders are concerned about include environmental protection, health and safety, climate change, human rights protection, and transparency (Ahmad et al., 2017). Despite the growing awareness of sustainability issues in general, researchers and industrial practitioners have concentrated more on environmental issues. The social issues in supply chains have been given little attention in both theory and practice (Zailani et al., 2012). Since production activities are spread across the globe me (Halldórsson et al., 2009; Mentzer et al., 2011), societies are continuously faced with degradation of the natural

environment and poor health conditions caused by industrial activities and pursuit of economic benefits (Wan Ahmad et al., 2016).

Crude oil is associated with high energy density, while natural gas is made-up of low sulphur components (Smil, 2015). This has played a significant role in the popularity of O&G products in areas of transport, electricity generation and heating. Advancements in various phases of the industry's supply chain including exploration, production and distribution have enabled the industry to satisfy growing needs for energy in the past decades (Ahmad et al., 2017). However, concerns are intensifying regarding the future availability of traditional petroleum products due to excessive exploitation of reserves (Farrell and Brandt, 2006; Wolf, 2009). Global energy demand is expected to rise by 1.20% yearly and by 2030, global energy use would increase by 35%, which would affect the price of oil (ExxonMobil, 2009). Recently, a forecast conducted by the British Petroleum (BP) shows that energy consumption across the globe would rise by 37% between 2013 and 2035, and the petroleum industry is expected to provide 55% of the overall source of energy within that period (BP, 2015). Research has shown that, while there is an increasing demand for petroleum products, its supply is decreasing (Bašić, 2009; Gardas et al., 2019). This shortage could influence the costs of other products and services (Yadav, 2002; Slaibi, 2011).

By the year 2050, the population of the world would be around 9 billion as projected. This massive increase in population would put significant pressure on the current natural reserves and affect climate change considerably (Berkes and Adhiraki, 2006). Since energy generation from fossil fuel is one of the major concerns of stakeholders, excessive consumption of energy in production process can be minimised by using energy efficient technologies (Martín and Grossmann, 2011; Yusuf et al., 2013). Incorporation of sustainable practices across the O&G supply chain can also enhance the effectiveness of exploration, production and logistical activities, and minimises oil spillage, gas flaring and accidents (Gardas et al., 2019). SSCM approach put emphasis on reducing negative environmental impacts through effective collaboration with suppliers (Erkul et al., 2015).

The cost intensive nature of the petroleum industry's operations and the inflexibility of its infrastructure create a need for collaboration with suppliers through SSCM practices, which will ultimately enhance the supply chain sustainability. Initiatives like selection of suppliers on the basis of social and environmental performance, supplier environmental assessment, use of energy efficient vehicles to minimise emissions, and health and safety training can be implemented (Wan

Ahmad et al., 2016). For big companies, the adoption of SSCM practices can increase price of stock (Bose and Pal, 2012), and innovation and profitability, which ultimately result in competitive advantage (Zhu and Sarkis, 2004; Yusuf et al., 2013; Lee and Wu, 2014). However, one major obstacle in the implementation of SSCM initiatives is loop closing (Zhu et al., 2008b), which entails diffusing sustainable practices and eco-design across the entire supply chain. Corporations seeking to attain the full benefits of adopting sustainable practices must integrate the SSCM approach into the various phases of their supply chains (Gardas et al., 2019).

Many firms in the petroleum sector are undertaking CSR initiatives to address issues associated with employee working conditions, environmental protection, and investments in local communities (Frynas, 2009). Even though substantial efforts are made towards such initiatives, the impact on both people and society is usually brief and short-term in nature because of a number of factors, including lack of involvement of CSR beneficiaries and failure to incorporate CSR initiatives into organisational development plans (Frynas, 2009).

The carbon-intensive nature of the petroleum industry remains an inevitable obstacle to the industry's sustainability efforts. Its supply chain is difficult to manage when compared to that of other manufacturing industries. For example, the product combination of O&G is more fixed and stable than that of car parts. Nevertheless, the products are very flammable and poisonous, which triggers significant ecological and social risks in the course of exploration, refining and logistical activities (Wan Ahmad et al., 2017). In terms of logistics, there are few ways of transporting the products because of the distance between sources of supply and petrol stations. The transportation requirements are riskier and more complicated in upstream section, where the exploration and production activities occur (Wan Ahmad et al., 2017). Generally, downstream sector is faced with issues such as emissions from refineries. In other words, downstream sector is directly associated with the sale of commodities that generate significant amount of emissions (Lenzen and Murray, 2010). To minimise GHG emissions, firms must change their production processes and adopt new technologies that support emission reduction (Kolk and Pinkse, 2004).

In light of the preceding paragraph, customers are increasingly conscious of the negative impacts that firms cause from their manufacturing. This triggered the formation of green customers assembly, which is saddled with the responsibility of influencing manufacturing firms to make commodities that have the least negative effect on customers and the environment (Houe and

Grabot, 2009) For firms to provide products and services that are friendly to the environment in the petroleum sector, they must engage in a number of activities such as sustainable sourcing, supplier selection based on environmental capabilities, waste reduction, carbon footprint reduction, ISO 14001 certification, eco-design, reverse logistics, and effective management of product lifecycle to minimise material waste (Lakhal et al., 2007; Yusuf et al., 2013). Firms can also adopt product design initiatives that will enable them to reduce life cycle impacts of products using less polluting chemicals and appropriate waste disposal (Gardas et al., 2019). These set of activities designed to minimise the negative environmental effects of supply chains are largely driven by government agencies, competitors, normative, mimetic, and institutional pressures (Zhu and Sarkis, 2004; Zhu et al., 2008b).

Competition can also influence firms' adoption of SSCM practices (Seuring and Müller, 2008), and the O&G sector is one of the most competitive industries (Wagner and Armstrong, 2010). Approximately 75% of the supplies of oil across the globe originates from Persian Gulf, Russia, and West Africa (Xu et al., 2008). Increasing competition amongst transnational and national oil corporations shows the intense competition currently happening in the industry (Wolf, 2009; Edwards et al., 2010). While the national oil companies control a considerable amount of the global O&G reserves, the international oil companies are facing difficulties in accessing the reserves and deteriorating terms of operations (Kjärstad and Johnsson, 2009; Miller and Sorrell, 2014). As a small number of firms control the O&G reserves, disruptions in supply could happen when there is lack of supportive policies, effective risk management, and investment in modern technologies (Farrell and Brandt, 2006).

In order to solve the pressure resulting from competition, international oil companies are putting more efforts towards creating alternative unconventional sources of energy such as shale O&G and oil sands, which offer more value for money when oil price is high. Therefore, there is a need for an effective risk control strategy that will help to minimise the economic and environmental risks associated with energy security (Farrell and Brandt, 2006). In addition, O&G corporations are faced with greater competition due to the growing focus on renewable energy (Edwards et al., 2010). This implies that corporations seeking to achieve a competitive advantage over their competitors must integrate sustainability practices in their organisational processes and improve the overall performance of supply chains (Beske et al., 2014; Beiranvad and Dorniani, 2022; Olugu et al., 2022).

As the pressure from policy-makers, customers and shareholders' increases, incorporating sustainability ideas in the petroleum supply chain is a necessity for firms willing to enhance their organisational processes and sustainability performance (Azadeh et al., 2015; Luthra et al., 2015; George et al., 2016). SSCM practices in the O&G supply chain are positively linked to environmental performance of firms and the social wellbeing of employees, and host communities (García-Rodríguez et al., 2013; Olugu et al., 2022). They are also associated with improvements in operational performance in the petroleum industry (Yusuf et al., 2013). Sustainable product design initiatives helps in reducing the life cycle effects of products on the environment (Gunasekaran and Spalanzani, 2012). According to Esfahbodi et al. (2016), 30% of the negative ecological effect of commodities originates from the point of design. Consequently, manufacturing firms in recent times have begun to consider sustainable product design to lessen the life cycle effects of their products (Gunasekaran and Spalanzani, 2012). Other key activities in SSCM approach such as reuse, recycle, remanufacture, and substitution of materials, can also enable firms to reduce production costs and maximise economic benefits (Eltayeb and Zailani, 2014). Therefore, proactive environmental initiatives can enhance the overall performance of O&G enterprises (Yusuf et al., 2013; Gao and You, 2015; Ahmad et al., 2017).

2.9 Review implications

Neiro and Pinto (2004) stated that the earliest study on SCM in the O&G industry was conducted in 1990's. However, the inclusion of sustainability into SCM came to limelight in the last two decades (Min and Galle, 2001). Supply chain sustainability in the petroleum industry has been a major concern because of its negative effects on the host communities (Lakhal et al., 2007; Wan Ahmad et al., 2017). In this regard, the application of SSCM practices in the sector is not just to achieve socially and environmentally friendly processes, but also to assist the sector to adapt to the continuously changing environment effectively (Ahmad et al., 2017). Nevertheless, the SSCM literature has not given the industry the required attention despite its significance (Hussain, 2006; Beiranvand and Dorniani, 2022; Olugu et al., 2022). To date, there is a dearth of studies on SSCM implementation in the industry.

Lakhal et al. (2007) carried out one of the earliest empirical investigations in the petroleum industry, which initiated the "Olympic" green notion for the managing supply chains in a way that

reduces emissions and waste. Their later study applied the Olympic notion in pinpointing the economic, social, and environmental disproportions and ineffective consumption of resources in the industry's production life cycle (Lakhal et al., 2009).

Midttun et al. (2007) examined the obstacles of incorporating CSR into the offshore petroleum supply chain. To mitigate oil spillage and improve environmental performance, Ivshina et al. (2015) recommend using bioremediation, which is an environmentally friendly technology that is affordable. Deng and Liu (2011) put forward a framework of GSCM for the Chinese petroleum sector, noting that the O&G enterprises in China have misunderstood the green concept. More so, GSCM studies have been criticized for focusing only on the environmental dimension of SSCM.

Other studies are about closed-loop GSCM (Min and Galle, 2001; Zhu et al., 2007; Zhu et al., 2008; Matos and Hall, 2007; Stindt and Sahamie, 2014), CSR (Hartman et al., 2007; Zutshi et al., 2009; Du and Vieira, 2012), and the application of sustainability practices and organisational performance (Yusuf et al., 2013). Recent studies focused on the forces influencing SSCM implementation in the sector (Frynas, 2009; García-Rodríguez et al., 2013; George et al., 2016; Wan Ahmad et al., 2016, 2017; Raut et al., 2017; Gardas et al., 2019; Beiranvand and Dorniani, 2022; Olugu et al., 2022).

However, majority of these studies are highly fragmented in that their focus is generally on the external pressures and regulations that force firms to implement SSCM practices, often neglecting complex organisational factors that determine how SSCM is implemented in firms, and the extent to which benefits derivable from its implementation interact with organisational factors (Wan Ahmad et al., 2016; Gardas et al., 2019). The lack of studies makes it necessary for research on SSCM implementation within the industry, in order to enhance our understanding on how the industry's internal environment could either enable or hinder progress towards SSCM implementation.

Therefore, there is a need for an effective framework, one that considers measurable organisational characteristics and performance outcomes of SSCM implementation. For example, it is essential to examine how the implementation of SSCM practices is influenced by factors such as business size, organisational culture, and quality of management. The extents to which these factors affect SSCM adoption and benefits derivable from SSCM investments in the O&G sector have not been extensively investigated in the SSCM literature.

2.10 Conclusion

This chapter provides an overview of extant literature on SSCM in industrial settings. It commenced with a brief background of SCM and the sustainability shift in supply chains. The review highlights the key terminologies regarding sustainability in supply chains, differentiating the SSCM and GSCM notions. Then, the adopted SSCM notion was then discussed along with its main components. Furthermore, the influence of organisational characteristics (corporate culture, business size, and QOM) on the adoption of SSCM practices is highlighted. In view of this, the organisational theories used by scholars to justify the internal drive of organisations towards SSCM adoption were presented.

While the review acknowledges the effects of external factors on SSCM adoption, the focus of this research is on the internal factors that motivate firms to implement sustainable practices. The central argument is that, rather than explaining the forces that pressurize organisations to be responsible in their operations, the current study seeks to clarify the benefits that firms could achieve through SSCM. In addition, the review also highlights the resulting performance outcomes from the implementation of SSCM practices. The next chapter aims to develop a conceptual framework, one that takes into consideration quantifiable organisational characteristics and performance outcomes in the O&G sector.

Chapter 3: Conceptual framework

3.1 Introduction

This chapter develops a conceptual model to examine the core internal organisational factors that influence SSCM implementation, and its ensuing performance outcomes. It begins with review of extant literature, identification of problem statement, and key variables to be examined. The theoretical basis for the proposed relationship depicted in the research framework is the RBV, DCV, and PBV. The purpose of the research framework is to explain the firm-level factors that are essential for SSCM adoption, and the resultant effect of this interaction on performance of firms. The framework seeks to provide an effective guide to better understanding of the link between the implementation of SSCM practices and organisational performance in the O&G industry context. The empirical validation of the framework is reported in Chapter 5.

3.2 Conceptual Framework Development

A conceptual model identifies related variables, categorise them, explain their connections, and allow a representation of the variables in the framework (Meredith, 2004). Primarily, a research framework is a model illustrating the main constructs or variables studied and representation of the hypothetical relationships between the variables. The research framework helps in limiting the extensiveness of the data by concentrating on particular variables and defining the precise standpoint (framework) that the examiner will follow in analysing and translating the information to be collected (Imenda, 2017). It is essential for a conceptual framework to show an understanding of concepts and theories that are relevant to the research questions and the broader research area (Swanson and Chermack, 2013). According to Sekaran and Bougie (2016), a research framework is a representation the researcher's views on how a given phenomenon (concepts) are linked to one another (a model) and a justification of why these variables are related (a theory). Some researchers

suggest three important steps to follow in developing an effective conceptual framework (Trochim, 2006; Swanson and Chermack, 2013). These include the following:

(i) **Identifying a research problem and main research variables** – The identification of a research problem is necessary because it forms the basis for developing the conceptual framework and anchors the whole study. After a research problem is stated, key variables in the research should be identified.

(ii) **Extensive review of literature and relevant organisational theories** – This entails reviewing prior studies to obtain insights on how researchers have solved a similar research problem, identifying the beliefs employed by the scholars in addressing the phenomenon, as well as selecting relevant theory to justify the interactions amongst the main constructs in the research.

(iii) **Develop constructs and propositions** – Classify the main variables into dependent and independent groups, review relevant theories, evaluate their significance to the study, and develop hypotheses.

Accordingly, this research employs the three-step approach recommended by Trochim (2006), and Swanson and Chermack (2013) in building a conceptual model and reviews extant literature not only on broader SSCM concept, but also on its implementation in the O&G industry context (see details in chapter 2).

3.3 Research Problem

The review of extant literature on SSCM implementation in the O&G industry shows that the studies are extremely fragmented. For instance, Wan Ahmad et al. (2016) investigated internal factors that are likely to influence SSCM but failed to consider organisational size and quality of management in its definition of a firms' internal environment. Majority of the studies on sustainable practices in the industry are simply focusing on the external pressures and regulations that force firms to implement such practices, often neglecting complex organisational factors that determine how SSCM is implemented in firms, and how performance outcomes derivable from its implementation are affected by organisational characteristics (Wan Ahmad et al., 2016; Gardas et al., 2019).

The lack of studies creates a need for an empirical investigation of SSCM implementation in the sector, in order to enhance our understanding on the extent to which the industry's internal environment could either promote or hamper development towards SSCM implementation. Therefore, there is a need for an internally oriented model, one that takes into consideration quantifiable organisational characteristics and performance outcomes of SSCM implementation. For example, it is essential to explore how the implementation of SSCM practices is influenced by factors such as business size, organisational culture, and quality of management. The extents to which these factors affect SSCM adoption and benefits derivable from SSCM investments in the O&G sector have not been extensively examined within the existing literature.

The starting point is the identification of important organisational factors from the synthesis and review of extant literature on SSCM. Building on existing frameworks (Deng and Liu, 2011; Ahmad et al., 2017; Paulraj et al., 2017; Beiranvand and Dorniani, 2022), this research develops a conceptual model that classifies the identified firm-level factors into three elements: (1) organisational culture; (2) business size; and (3) quality of management. The proposed framework, guided by the literature and relevant theories, offers a platform to examine and explain the core internal factors that could affect SSCM implementation and firm performance. Moreover, it provides the foundation for formulating hypotheses. Additionally, empirical findings will be used to validate the research framework in Chapter 5 in order to answer the research questions.

3.4 Hypothesis Development

Having reviewed extant literature and relevant organisational theories, this section attempts to formulate the hypotheses that will be tested in this study, which form the basis for the research framework. The research framework consisting of five key constructs: organisational culture, business size, quality of management, sustainability practices, and firm performance, is illustrated in Figure 3.1. Five boxes were used to describe the connections of the research constructs in the framework. Specifically, the first box is organisational culture, second box is business size, third box is quality of management, fourth (middle) box is aggregate SSCM practices, and fifth is aggregate business performance. The arrows indicate the direction of the relationships between the constructs. In the subsequent sub-sections, a number of propositions and hypotheses were proposed for empirical testing and validation.

3.4.1 Link between organisational culture and SSCM practices

Organisational culture plays an important role in influencing business processes (Jarnagin and Slocum, 2007), unifying organisational competences (Day, 1994), offering answers to the challenges encountered by firms (Schein, 1984), and thus, facilitating or hampering the attainment of organisational goals (Fondas, 1991). Therefore, corporate culture is a major driver of SSCM adoption in firms (Carter and Jennings, 2004; Cuthbertson, 2011).

SSCM implementation is facilitated by managerial actions and decisions (Seuring and Müller, 2008; Pagell and Wu, 2009). As a result, firms must undergo substantial cultural transformation and change in order to address environmental and social challenges effectively. Several non-empirical studies (Linnenluecke and Griffiths, 2010; Gupta and Kumar, 2013; Marshall et al., 2015; Hong et al., 2022) have argued that organisational culture is a major driver of SSCM practices. It is believed that a culture that supports sustainability decisions will motivate organisational members to take sustainability initiatives seriously (Linnenluecke and Griffiths, 2010; Ramus and Marcus, 2017). When sustainability becomes part of an organisation's culture, all employees will embrace the idea (Cuthbertson, 2011). Supportive organisational culture is vital to SSCM, as it can encourage its implementation in firms (Carter and Rogers, 2008; Pagell and Wu, 2009).

The primary idea is that corporations must nurture a sustainability-oriented organizational culture to support their SSCM agenda (Linnenluecke and Griffiths, 2010; Hong et al., 2022). Sustainability culture promotes the implementation of proactive socially and environmentally responsible practices along the supply chain (Wan Ahmad et al., 2016; Hong et al., 2022). Scholars have contended that firms with sustainability cultures often undertake environmental practices beyond regulatory standards (Banerjee, 2002; Pagell and Wu, 2009). Other scholars have demonstrated the role of sustainability culture in the adoption of GSCM initiatives (Wu et al., 2012). This implies that successful SSCM implementation would depend largely on the values and ideological underpinnings of a company's culture (Linnenluecke et al., 2009; Gupta and Kumar, 2013; Marshall et al., 2015). Thus, strong organisational culture is posited to have positive effect on the implementation of sustainability practices.

H1: A strong organisational culture has positive effect on the implementation of SSCM practices.

3.4.2 Link between business size and SSCM practices

Business size is a vital enabler of organisational innovations by firms (Damanpour, 1992; Rogers, 2004). Organisational resources, such as human and monetary capital can be an estimate of organisational size (James, 1999). The size of a company is essential because it is a source of organisation's capabilities (Mole et al., 2004).

According to the resource-based view, larger corporations tend to have more financial resources and competences to address environmental concerns (Barney, 1991). In this regard, the influence of firm size in the implementation of sustainability practices is largely due to resource-based capabilities (Zhu et al., 2008). While bigger corporations possess the required resources to undertake a bundle of social and environmental initiatives to reduce their negative effects on the environment, smaller organisations can only afford to implement specific environmental initiatives (Lenox et al., 2000; Sharma, 2000). This implies that the environmental initiatives that work for bigger firms might not be suitable for SMEs because of their resource limitations (Pimenova and Van der Vorst, 2004).

Del Brío and Junquera (2003) investigated the factors affecting the implementation of environmental innovations. The study found that the lack of environmental innovations among SMEs could be a consequence of many factors, such as limited financial resources, nature of organisational structure, and low abilities to obtain innovations. Their findings suggest that bigger organisations have a greater tendency to implement SSCM practices than SMEs.

H2: Organisational size has positive effect on the implementation of SSCM practices.

3.4.3 Link between QOM and SSCM practices

Managerial competence is essential in the design and implementation of organisational initiatives (Coggburn and Schneider, 2003) such as SSCM practices. Thus, managerial capacity and strength are essential drivers of such initiatives (Mcguire et al., 1990). The efficiency of a corporation is determined by the ability and readiness of managers to stimulate successful implementation of initiatives within the company (Ghoshal and Bartlett, 1994). Numerous studies have pointed out that top management commitment is crucial to SSCM implementation in organisations (Sarkis et al., 2011; Harms et al., 2013).

It is the duty of top management to make sure that such initiatives are embraced by all and sundry in the organisation (Wittstruck and Teuteberg, 2012; Raut et al., 2017). In doing so, designing and communicating straightforward strategies by top management will motivate staffs to demonstrate more commitment towards achieving sustainability goals (Pagell and Wu, 2009; Wittstruck and Teuteberg, 2012). In this regard, it is evident that QOM plays a critical role in nurturing a positive behaviour among organisational members (Doz and Prahalad, 1991).

In today's business environment, effective management entails extending the traditional focus of maximising economic benefits to include activities like employee health and safety training and developing environmentally responsible products (Waddock and Graves, 1997; Rodríguez-Pose and Garcilazo, 2015). Therefore, companies with better QOM will likely undertake more proactive social and environmental initiatives (Waddock and Graves, 1997) to reduce negative environmental impacts than those with lesser QOM.

H3: Quality of management has positive effect on the adoption of SSCM practices.

3.4.4 Link between organisational culture and firm performance

Researchers have argued that organisational performance is determined by the extent to which the cultural values are strong, that is, widely shared and held among organisational members (Peters and Waterman, 1982; Heskett and Kotter, 1992). It is therefore important to utilise the numerous benefits that can be provided by culture, instead of paying attention to only the tangible aspects of the organisation (Johnson, 1992). Strong cultures, defined as a collection of values and norms that are strongly embraced and shared within a company (Saffold III, 1988; O'Reilly and Chatman, 1996), have been found effective in improving the performance of firms through influencing workforce motivation, attainment of shared goals, and teamwork (Peters and Waterman, 1982; Heskett and Kotter, 1992; Trefry, 2006).

Specifically, the performance advantages of a strong corporate culture arise from three consequences of having strongly held and widely embraced norms and values: greater harmonisation in the corporation, emphasis on mutual organisational objectives by personnel and shareholders, and greater motivation of personnel. In this regard, several studies observed that corporations with strong cultures perform better than those with weak cultures (Gordon and DiTomaso, 1992; Burt et al., 1994; Lee and Yu, 2004). For instance, attempts by researchers towards explaining the sustained economic performance of companies including McDonald's and

IBM centred on the managerial beliefs and values symbolised in the cultures of these companies (Peters and Waterman, 1982; Barney, 1986). In view of these assertions, one can argue that companies with sustained performance are generally characterized by a strong collection of fundamental managerial values that describe the way they operate in the business environment.

H4: A strong organisational culture has a significant positive effect on firms' performance.

3.4.5 Link between QOM and firm performance

QOM is a necessary antecedent to performance (Ghoshal and Bartlett, 1994; Coggburn and Schneider, 2003). It is widely accepted that management actions may have an impact on firm performance (Mcguire et al., 1990). This is based on the assumption that performance is the ultimate management responsibility. Firms with more management capacity have the ability to perform better than firms with less management capacity (Brown, 1982). In the last two decades, many researchers have called for a more rigorous investigation of the link between management capabilities and firm performance (Rainey and Steinbauer, 1999; Heinrich and Lynn, 2001). Rodríguez-Pose and Garcilazo (2015) found that inefficient institutions are faced with various problems, which lead to poor productivity, affecting in turn, the capacity of institutions to effectively deliver services and policies.

In order to compete effectively, organisations must concurrently balance external adaptability with internal assimilation and harmonisation, as well as achieve a balanced composition of bottom-up involvement with top-down control (Fisher, 1997). The way a firm is being shaped has a direct and significant effect on organisational performance. consequently, it is a core responsibility of managers (Ghoshal and Bartlett, 1994). Nowadays, companies present their economic performance in a manner that boosts the organisation's quality (Salancik and Meindl, 1984). This is because strong performance is considered as the outcome of effective management (Mcguire et al., 1990). Despite efforts by managers to evade blame for low performance, research has shown that management are held responsible whenever performance fails, and that poor economic performance has negative implications on the quality of management in firms (Brown, 1982).

H5: Quality of management has positive effect on firms' performance.

3.4.6 Link between SSCM practices and firm performance

Numerous studies have shown that firms could improve their performance through SSCM practices (Wagner and Blom, 2011; Ahi and Searcy, 2015; Habib et al., 2021). SSCM approach emphasise controlling pollution, socio-efficiency and eco-efficiency (Young and Tilley, 2006; Srivastava, 2007). These notions focus on the win-win solutions, in which the economic gains are integrated with environmental protection (minimising raw materials exploitation and reducing waste), as well as social equity (controlling negative social impact and maximising the positive ones). Many scholars confirm the prospects of SSCM in improving relationships among supply chain members, collaboration, competitiveness, and performance (Wagner, 2005; Gyula, 2013; Paulraj et al., 2017). The application of SSCM practices within supply chains can enhance economic performance (Zhu and Sarkis, 2004; Gyula, 2013), social performance (Gimenez et al., 2012; Savitz and Weber, 2014), environmental performance (Minardi et al., 2021; Munoz-Torres et al., 2021), and operational performance (Yusuf et al., 2013) of manufacturing firms.

Some important advantages of SSCM include decrease in price of components and products wrapping through materials recycling (Zhu et al., 2007; Eltayeb et al., 2011), lessening ecological risks and enhancement of corporate reputation (Srivastava, 2007; McWilliams and Siegel, 2011; Kottala, 2021), and improvement in quality of services and commodities, flexibility and delivery speed (Sarkis et al., 2010). Other benefits include improvements in health and safety (Fernández-Muñiz et al., 2009; Siems et al., 2021), work conditions (Engert et al., 2016; Van Nguyen et al., 2021), quality of life (Pullman et al., 2009; Luthra et al., 2015; Khan et al., 2021), and employee development (Fuzi et al., 2012; Siems et al., 2021).

However, majority of existing works on the effect of sustainability practices on business performance have reported mixed findings. Other studies either concentrated on a few dimensions or focused on a specific facet of performance. For instance, Paulraj et al. (2017) examined the performance outcomes of SSCM using financial and environmental performance indicators. Rao and Holt (2005) explored the relationship among SSCM and economic performance. Zhu and Sarkis (2004) examined the effect of SSCM on financial performance and environmental performance. Esfahbodi et al. (2016) focused on the effects of SSCM on environmental, operational, and cost performance. Govindan et al. (2013) measured sustainability performance using the TBL framework. Overall, the review of extant literature reveals that a considerable amount of the existing research was limited in a number of ways:

(i) They focused on either a few dimensions or a particular facet of performance only.

(ii) They were either industry-specific or country-specific, thus limits the generalisability of results.

(iii) They did not consider the effects of interactions between firm characteristics and SSCM practices on performance.

Consequently, this study builds on the TBL performance pillars and incorporates operational performance pillar in order to capture all the expected performance outcomes of SSCM implementation, as suggested by Luthra et al. (2016). In addition, the proposed conceptual framework examines the association between SSCM adoption and performance outcomes using data obtained from the O&G industries of two countries (Nigeria and the UK). Although this study is industry-specific, the collection of data from two countries i.e., developed and developing economies makes it different from previous SSCM studies in the industry. This will enable a better generalizability of findings obtained. Thus, it is posited that sustainability practices are positively associated with organisational performance.

H6: SSCM practices have positive effect on firms' performance

3.4.7 Mediating role of SSCM practices on the link between organisational culture and firm performance

The review of extant literature indicates that the relationships between organisational culture and performance, the link between organisational culture and SSCM practices, as well as the association between SSCM practices and firm performance have been investigated separately. However, there is scarcity of research take considers the simultaneous investigation of organisational culture, sustainability practices, and firm performance. Although a number of scholars suggest that strong organisational culture is related to superior performance (O'Reilly and Chatman, 1996), certain type of organisational culture is linked to SSCM practices (Linnenluecke and Griffiths, 2010), and SSCM practices affect performance (Paulraj et al., 2017), the exact nature and type of association among these three concepts are not properly understood. Thus, further research is required on mediating variables in the culture-performance link, in order to enhance our understanding of "how" and "why" culture affects performance (Gregory et al., 2009).

In light of the aforementioned, Maletič et al. (2015) suggested a research on how organisational culture influences performance outcomes indirectly through sustainability practices. This study

seeks to fill that void by exploring SSCM strategy as one possible explanatory mechanism through which an organisation's culture influence its performance. Therefore, it is contended that organisational culture is only associated with greater performance when it enables companies to consistently adapt to the changing circumstances in the business environment.

H7: SSCM practices mediate the relationship between organisational culture and firm performance.

3.4.8 Mediating role of SSCM practices on the link between QOM and firm performance

There is a dearth of studies on the links between QOM and organisational performance, and the links between QOM and SSCM practices. Much of the operations and SCM literature has paid little attention on the potential influence of idiosyncratic firm attributes on performance outcomes (Marshall et al., 2016). Unique and hard-to-imitate factors, such as management attributes are believed to play an important role in the attainment of greater sustainability performance (Barney, 1991). QOM is a necessary antecedent to performance (Ghoshal and Bartlett, 1994; Coggburn and Schneider, 2003). Therefore, firms with more management capacity often outperform those with poor management competencies. With regard to SSCM, top management leadership and commitment are crucial to its adoption (Siems et al., 2021; Van Nguyen et al., 2021).

Communicating a straightforward SSCM approach by top management can motivate personnel to demonstrate more commitment towards achieving sustainability goals (Pagell and Wu, 2009; Wittstruck and Teuteberg, 2012). However, majority of these assertions are literature-based conclusions. To date, there is a lack of research on the concept of QOM and its relationships to sustainability practices and firm performance.

Consequently, it is vital to explore the indirect and direct effects of QOM on organisational performance in order to enhance our understanding of "how" and "why" QOM may have an influence on performance outcomes. This study will therefore break new grounds by investigating the role of QOM as a driver of SSCM implementation and examining the resultant effects of this interaction on organisational performance. H3 is the study's hypothesis for direct relationship, which is mentioned in the preceding section. In addition, it is argued that QOM will likely affect performance indirectly through sustainability practices.

H8: SSCM practices mediate the relationship between QOM and firm performance.

Considering the proposed relationships mentioned so far, figure 3.1 illustrates the conceptual model of this study, which is described by five boxes. Specifically, the first box is organisational culture, second box is business size, third box is quality of management, fourth (middle) box is aggregate SSCM practices, and fifth is aggregate business performance. The arrows indicate the direction of the relationships between the constructs.

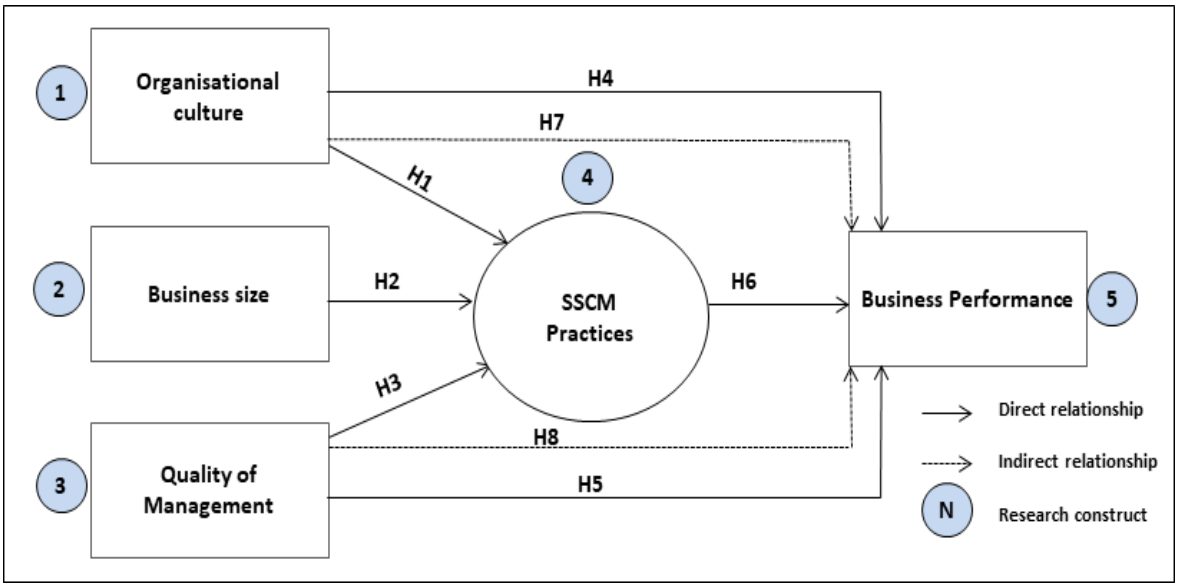

Figure 3. 1: The research framework

3.5 Interpretation of the conceptual framework from the perspective of organisational theories

In order to examine the associations listed in the conceptual model (illustrated in figure 3.1), eight (8) hypotheses were formulated from the questions of the study stated in section 1.3. These hypotheses were developed based on theoretical and empirical evidence from extant literature. The eight hypotheses investigate the relationships between organisational characteristics (culture, business size, QOM), SSCM practices, and performance outcomes. Apart from the direct associations among these variables, the mediating effect of SSCM practices in the link between organisational factors and performance outcomes are also proposed. The following paragraphs

attempts to explain the proposed relationships in the conceptual framework from the perspective of organisational theories.

While the PBV posits that difference in performance can be partly explained by the implementation of publicly available practices and/or activities (Bromiley and Rau, 2014), the resource-based view (RBV) of the organisation holds that the possession of VRIN capabilities and resources simultaneously is the key to competitiveness (Barney, 1991). Organisational resources encompass all assets, processes, attributes, competences, information and knowledge, management skills, and others, which are controlled by an organisation (Barney, 2001). Similarly, the dynamic capabilities view (DCV) suggests that organisations' ability to create, integrate, and reconfigure resources in order to adapt to the changing business environment determines competitive advantage (Bromiley and Rau, 2014; Lin and Wu, 2014).

Studies have shown that strong cultures (O'Reilly and Chatman, 1996; Hock et al., 2016) and managerial capacity (Ghoshal and Bartlett, 1994) are sources of firm's capabilities. For example, recent attempts by researchers to justify the sustained economic performance of companies including Apple, Mc-Donald's, and IBM centred on the managerial beliefs and values symbolised in these companies' cultures (Flamholtz and Randle, 2013). In this context, firms' ability to sense, seize, develop resources and capabilities, and adapt to the changing environment will determine the implementation of SSCM practices. Thus, hypotheses H1– H3 are proposed. In addition, firms' possession of VRIN resources and capabilities will improve their organisational performance. Therefore, hypotheses H4 – H5 are proposed. Hypotheses H1 – H5 are formulated based on the theoretical position of the RBV and DCV, as well as supporting evidence from previous studies.

The theoretical basis for the formulation of hypotheses H6 is the PBV of the firm. According to Bromiley and Rau (2016; p. 101), companies generally do not utilise all the fundamental practices that could be of benefit to them, perhaps because of bounded rationality. Therefore, the performance could be partly explained by inimitable practices, which are available in the public and flexible to transfer across companies (Bromiley and Rau, 2014). Several studies have observed that the main impact of SSCM practices tend to be achieved in the long-term. Generally, additional costs should be expected by organisations from the implementation of such initiatives because they require huge resource investment (Yang et al., 2011; Zhu et al., 2013). However, multiple benefits such as cost effectiveness, reduced environmental impacts, improved employee health and safety,

and improved quality performance can be realised in the long-term (Rao and Holt, 2005; Wagner and Blom, 2011; Green et al., et al., 2012). This indicates a win-win solution in which better performance is achieved through execution of SSCM practices. Based on the assumption of the PBV and supporting evidence from extant literature, this research proposes hypotheses H6 on the direct influence of SSCM practices on organisational performance.

The hypothesized existence of direct relationships between organisational characteristics (culture and QOM) and SSCM practices, between SSCM practices and firm performance, and between organisational characteristics (culture and QOM) and performance discussed in the preceding sections indicate that SSCM practices could explain the effect of organisational characteristics (culture and QOM) on performance. Therefore, the mediation effect of SSCM practices on the link between culture and firm performance, as well as between QOM and performance is proposed (H7 – H8). As illustrated in the conceptual framework in figure 3.1, culture and QOM are the independent variables, SSCM practices act as mediator, and business performance is the dependent variable. The theoretical basis for the formulation of hypotheses H7 – H8 is the DCV, RBV, and PBV. Although firms' possession of VRIN resources and capabilities improve its performance, channelling these capabilities and resources towards the execution of publicly available practices enables the achievement of sustained performance. The focus of the mediation testing is to investigate the extent to which SSCM practices explain the effect of organisational culture and QOM on performance outcomes.

Table 3. 1: List of research hypotheses

Research questions	Description	Hypothesis
1	What are the effects of organisational culture, business size, and quality of management on the implementation of SSCM practices?	H1: A strong organisational culture has a significant positive effect on the implementation of SSCM practices.
		H2: Organisational size has a significant positive effect on the implementation of SSCM practices.
		H3: Quality of management has a significant positive effect on the implementation of SSCM practices.
2	What are the effects of organisational culture and quality of management on firm performance?	H4: A strong organisational culture has a significant positive effect on firm performance.
		H5: Quality of management has a significant positive effect on firm performance.
3	What effect does the implementation of SSCM practices have on firm performance?	H6: SSCM practices have a significant positive effect on firm performance.
4	Does SSCM practices mediate the relationship between organisational factors (culture and quality of management) and firm performance?	H7: SSCM practices mediate the relationship between organisational culture and firm performance.
		H8: SSCM practices mediate the relationship between quality of management and firm performance.

3.6 Conclusion

Firstly, this chapter reported the conceptual model of this study, which examines the influence of firm-level factors (culture, business size, and QOM) on the implementation of sustainability practices, and its subsequent performance outcomes. Secondly, the framework examines the direct link between SSCM implementation and organisational performance. Thirdly, the framework explores the mediating role of SSCM practices on the relationships between organisational factors and firm performance. The hypothesized relationships in the research framework are based on empirical evidence from extant literature, along with theoretical evidence from the DCV, RBV,

and PBV. The proposed framework and research hypotheses will be tested and validated in Chapter 5.

The following chapter presents the research methodology, including justification of the philosophical positions adopted and data collection method, and an outline of the statistical techniques and tools employed in this study.

Chapter 4: Research Methodology

4.1 Introduction

Chapter 4 explains the primary theoretical assumptions and the methodology adopted in this research. Specifically, this chapter presents some definitions of research, overview of research philosophy, justification for the selected research paradigm, outlines and explain the methodologies used in collecting data and analysing the data obtained, as well as testing the validity of research the framework that was presented in the previous chapter.

4.2 Definition of Research

The term 'research' does not have one universally accepted definition. Thus, scholars describe research based on their perspectives and disciplines. Sekaran and Bougie (2016) defines research as the procedure of finding answers to a specific problem following a thorough study as well as the analysis of situational factors. Another definition by Collis and Hussey (2003), states that research is a systematic and organized process of investigation, which is expected to produce solutions to a problem. Oates (2005) defines research to be the formation of new knowledge through an appropriate procedure, in order to satisfy the primary research users. More detailed elaboration was given by Oates, who, notes that research is often employed in our day-to-day activities; including identification of a problem, data or information collection, analysis and interpretation of the data, as well as drawing conclusions about the observed or studied phenomenon.

In the field of operations and supply chain management, researchers can adopt various research philosophies, approaches, and methods to conduct a study (New, 1997). Research in this field and other business-related disciplines seeks to identify or investigate problems encountered in organisations or within the business world. Easterby-Smith et al. (2015) describes business research as a systematic, databased, critical inquiry into a particular problem, which was done with the sole aim of getting solutions to it. The aim of conducting this research is to investigate the

interplay between organisational characteristics (culture, size, and quality of management) and SSCM practices, and their significance on business performance in the oil and gas industry context.

4.3 Research Philosophy

Research philosophy is concerned with the creation of knowledge and its nature. An understanding of the philosophical foundations of a research is important in that it enables a researcher to identify which design is applicable to the research project (Easterby-Smith et al., 2015). This involves considering not only what type of data is required and how it is to be collected and analysed, but also how this will provide adequate answers to the questions being examined in the study. A researcher's predisposition towards a particular philosophy considers a number of factors including personal belief, it assumes the researchers' view about the social world, as well as their purpose of obtaining knowledge (Louis et al, 2006). Hence, the choice of research methodology is determined by the philosophical underpinnings of a research (Holden and Lynch, 2004).

In social enquiry, there are two primary branches of research philosophy, which are ontology and epistemology. The first, Ontology talks about the primary assumptions and views concerning the nature of reality on whether the reality in social world should be perceived objectively or subjectively (Saunders et al., 2009; Sekaran and Bougie, 2016). Epistemology is concerned with appropriate ways of enquiring into the nature of knowledge; it builds up to two philosophical positions, that is the positivist approach and interpretive approach, which are the epistemological philosophies chosen by researchers in social science (Saunders et al., 2009; Sekaran and Bougie, 2016). Researchers' choice of epistemological position largely depends on their model and/or pattern of thinking (paradigm), views on ontology, i.e. nature of reality, as well as ways of acquiring knowledge about it (i.e. Epistemology) (Lee and Hall, 1989). Generally, every research is founded based on underlying assumptions on the constituents of a 'valid' research and the methods, or approaches that are best for carrying out a research (Easterby-Smith, 2015). Positivism and interpretivism are discussed in the following sections.

4.3.1 Positivism

The positivist philosophy is an approach to research that believes in the external existence of reality, which has to be measured using objective methods (Easterby-Smith et al., 2015). Positivism emphasise that only evidence gotten from sensory experience and analysed by logical mathematical processes forms a convincing source of knowledge (Saunders et al., 2009). Positivist philosophy assumes that valid knowledge is acquired directly from scientific observation and/or experience. That is, the social world exists independently of humans and not solely in our minds, which researchers can study, capture, and measure (Denzin and Lincoln, 2013). Positivist researchers tend to reject speculations, invisible views, metaphysical and theological explanations. They use a structured and organised approach in a research process by outlining the topic of interest, hypothesis formulation, and adopting a methodology that is suitable to the research (Creswell, 2014). Accordingly, the observer (researcher) is independent of what is being observed and therefore is only an observer of social reality (Bryman and Bell, 2011; Sekaran and Bougie, 2016). Positivist researchers' use quantitative data obtained through strict adherence to scientific rules; this data is often gathered by means of experiment, observation, and surveys (Neuman, 2012).

Positivism has a historic association with the social sciences. Soni and Kodali (2012) reviewed 619 Supply Chain Management (SCM) publications, suggesting that majority of the empirical studies had a positivist approach. Additionally, Halldórsson and Arlbjorn (2005) observe that in SCM field, researchers are more interested in examining measurable and quantifiable variables hence, the choice of positivist quantitative approach. Thus, this study selects the positivist paradigm as the study is aimed at investigating the interactive effects of a set of variables (predictors) in determining an outcome variable.

4.3.2 Interpretivism

Interpretivism philosophy also known as constructionism, attempts to study a phenomenon in its natural environment, and believes that 'reality' is not exterior and objective, rather it is subjective, socially constructed and gives meaning to people in their daily interaction with others (Easterby-Smith et al., 2015). Interpretivism focuses on identifying, exploring and explaining the manner at which all elements in a social setting are associated or their interdependence (Krauss, 2005).

The idea of interpretivism is to understand human thought, actions, reasons, and meanings that people place upon their experience (Neuman, 2012). Interpretive researchers tend to rely on unstructured and flexible approach to research unlike the logical scientific procedures of positivism. These are of course receptive to getting a meaning of what is being considered as reality and for translating meanings in social interactions (Krauss, 2005).

Interpretive researchers does not have ways of verifying truth statements, they write fiction, rather than science (Denzin and Lincoln, 2005). This is because interpretivism lacks representativeness as a point of observation for a social phenomenon, and rigor in the gathering and interpretation of data (Denzin and Lincoln, 2005). In interpretive research, the observer is part of what is being observed and makes effort towards shaping the research process with his/her beliefs, assumptions, and actions with the aim of increasing the general understanding of the situation (Easterby-Smith et al., 2015). Interpretive researchers use qualitative data, which is gathered through different ways such as interviews, focus groups, ethnography, or review of documented literature (Saunders et al., 2009). In the course of this research, the interpretive method was ruled out due to its lack of academic rigor and the nature of the research.

4.3.3 Justification for choice of approach

There is no one best approach for conducting research; however, the choice is based on the research questions and subject matter. In selecting a research approach/paradigm, the choice is most often between positivist and interpretivist philosophies (Gill and Johnson, 2010). Several studies have shown that the key features of the selection of research philosophies are attributed by their methodology, epistemology, and ontology (Bryman and Bell, 2011; Sekaran and Bougie, 2016). These elements provide a general understanding of the methodological approaches utilised in discovery, interpretation, and interaction with knowledge (Bryman and Bell, 2011). To improve the quality and research validity, Gill and Johnson (2010) suggest an approach to be adopted by the researchers which is best suitable for the problem under consideration and other variables, as no one methodology can be considered inherently better than the other. Hence, a research approach or paradigm that is relevant to the research questions should be adopted. The main features of positivist and interpretive philosophical paradigms are outlined below in the following table.

Table 4. 1: Main characteristics of Positivist and Interpretive paradigms

Paradigm	Positivism	Interpretivism
Ontology	Considers reality as objective and singular (its knowledge is governed by laws of nature)	Considers reality as subjective and multiple (its knowledge is interpreted by individuals and are constructed socially)
Epistemology	Adopts objectivist approach in which the researcher does not interfere with the study	Adopts the approach of subjectivity in which the researcher is in collaboration with the field participants
Methodology	Adopts experimental approach where research questions and/or hypotheses are formulated in advance, subject to empirical investigations	Investigative approach where the researcher elicits individual constructions and refines such hermeneutically, with the purpose of generating constructions where there is substantial consensus
	Deductive approach is adopted by the researcher, it utilises a predetermined research design, while attempting to position the research to a generalized form	An inductive approach is adopted by the researcher, it uses an emerging design while studying the topic within its context

Source: (Guba, 1990)

In this study, the positivist philosophical approach is adopted. The selection of this is because SCM is a normative science, where reality is considered as measurable, objective and quantifiable (Forza, 2002). Thus, a positivist paradigm is more appropriate. It is thus obvious that the underlying philosophy for our research questions is based on positivism, as they emphasize about concepts, practices, and theories involved towards the implementation of sustainable supply chain practices. Specifically, the questions seek to explore the factors that influence the adoption of SSCM practices. This is due to the assumption that sustainable practices improve the overall performance of firms. Consequently, adopting positivism helps in examining the aforementioned variables, and their significance towards developing a conceptual model. The model aims at addressing key internal factors that drive SSCM adoption within firms and the resultant effects of this interaction on performance outcomes. In that regard, the emphasis of positivism on quantifiable measures of variables, evidence of propositions, hypotheses formulation and testing, as well as drawing predictions from previously studied phenomenon while explaining reality in the social world, is met (Orlikowski and Baroudi, 1991).

4.4 Research strategy

This refers to the overall plan and procedures of the manner researcher intends to approach answering the research questions (Hussey and Hussey, 2015). The selection of a research strategy mainly depends on the research objectives, research questions, views on what constitutes a good research, and on practical aspects such as access to information and time limitations (Maylor et al., 2017). There are two basic classifications of research strategies in social science: non-empirical and empirical approaches. Hence, researchers use elements of non-empirical, empirical, or combining the two (2) approaches while answering research questions (Avison et al., 2008). Here, an empirical approach was employed, so as to answer the research questions.

4.4.1 Non-empirical approach

This research strategy or inquiry is largely on analytical, conceptual and theoretical reasoning, it is not on a particular data set (Avison et al., 2008; Alavi and Carlson, 2015). There are three categories of a non-empirical research namely: Conceptual, Illustrative and Applied concepts. Conceptual research is concerned with synthesizing pre-existing knowledge to develop conceptual models, frameworks or theories, and provides interpretations and reasons. On the other hand, illustrative studies develop advisory frameworks and guideline for practical use. These frameworks are mainly in the form of suggestions for action, or processes to follow in a particular situation. Lastly, applied concepts research combines features of conceptual as well as illustrative research (Alavi and Carlson, 2015).

4.4.2 Empirical approach

This strategy on the other hand is primarily concerned with using data gathered through direct or indirect observation or experiment (Avison *et al.*, 2008). It is based on observed and measured phenomena, and knowledge is derived from real experience rather than from theoretical reasoning or belief (Alavi and Carlson, 2015). The information or data can be qualitative, quantitative, or a combination of the two (2), that is mixed method (Maylor et al., 2017). According to Collis and Hussey (2009), in empirical studies, there are two important categories, which are used for evaluation. These categories include the following: Quantitative/Qualitative and

Deductive/Inductive. The next sections provide a detailed explanation of quantitative research method, as well as the deductive and inductive approaches to empirical research.

4.4.2.1 Quantitative research

Quantitative method has been the most popular strategy for conducting business research over the past decades (Bryman and Bell, 2015). Quantitative research uses forms of logical and data-led approach in providing a measure for the phenomena under study, from a statistical viewpoint (Creswell, 2009). Quantitative research is not only about the collection of numerical data, however, it involves exhibiting a relationship view between theory and research as deductive, which is a preference for the approach of natural science (positivism), and concept of objectivity for social reality (Bryman and Bell, 2015). Quantitative approach is based on the positivist philosophy, and a deductive approach (Saunders et al., 2015). The primary aim of quantitative research is testing the hypothesis and verifying theories by examining the research questions, and demonstrating the link between theory and research (Neuman, 2012). This approach put emphasis on observations through scientific instruments or devices, and measurement as the ways to obtain insights into a phenomenon of interest. The researcher is independent of the studied phenomenon and only focuses on identifying general patterns or behaviour, which can be interpreted as theories (Maylor et al., 2017).

Quantitative researchers believe the natural world is real and capable of being studied objectively; that is, scientists conduct research as if they can study the social world without any influence of their personal beliefs or opinions about what the findings could be. They strive to develop general principles about the behaviour of people, institutions or social systems, rather than searching for physical laws (Maylor et al., 2017). The distinguishing feature of quantitative research is that it values quantification of social aspects of the social world, and have a distinct epistemological and ontological stance (Blumberg et al., 2008).

Quantitative research is based on four criteria: measurement, causality, generalization, and replication. Measurement is concerned reliability and validity of research findings; validity is the degree at which the approach or procedure provides a correct response and measure objective reality, and reliability indicates the degree at which the approach provides same answer when conducted again. Causality is the extent of explanation on why things are the way they are by demonstrating causal effects between independent variable and dependent variables.

Generalizability refers to the extent findings can be generalized beyond the confines of the specific context where the study was carried out. Replication is the degree to which findings can be reproduced when the same procedure is applied by another researcher (Bryman and Bell, 2015). There exist different methods of conducting quantitative research, such as surveys and experiments.

- *Survey research* – This is *"*a systematic way used to gather data from (a sample of) entities with the aim of building quantitative descriptions of the attributes of a bigger population, where those entities are members. The word 'systematically' is for a purpose and meaningfully characterises surveys from other methods through which information is gathered. '(A sample of)' phrase features in the definition since surveys aim at measuring everyone in a population sometimes and at other times it is just a sample that owed to be measured*"* (Groves et al., 2009; p. 2).

  The procedure of conducting survey includes sample selection, questionnaire design, and gathering of data (Forza, 2002). A survey is either descriptive (explaining a studied phenomenon), exploratory (early research into a particular theoretical or hypothetical idea), or confirmatory (linking ideas to understand causal effects). Questionnaire is the instrument used for data collection survey. It is distributed to a sample of the population. Sampling involves selecting a fraction of the population to represent the demographic features of the entire population. The main argument of sampling in research is that limitation in resources makes the survey of the entire population impossible (Sekaran and Bougie, 2016).
- *Experimentation* – Experiments are associated with a deductive approach to research. Experiment is a method of inquiry that utilises manipulation of variables and testing to examine causal links and processes. The primary aim of applying experiments to natural science field is to study relationships between variables, and to obtain insights into the extent where a change in predictor variable stimulates change in outcome variable. The researcher deliberately manipulates the independent variable to assess the consequence of this manipulation on the dependent variable (Sekaran and Bougie, 2016).

Experimenters examine natural or physical systems by breaking them down into a set of smaller parts or systems that can be studied in isolation from the entire system (reductionism). Even though experiments are not popular in business and management research, to understand quantitative research it is vital to gain insights on the role of design, analysis and experiment. This is because the experiment is appropriate for testing cause-and-effect relationships (Maylor et al., 2017). Experiment is an essential design to use under the right circumstances. Nonetheless, it is not always feasible in an applied research context where the researcher seeks to address a management problem. Similarly, experimental designs are less appropriate in addressing descriptive and exploratory research questions (Blumberg et al., 2008).

4.4.2.2 Inductive and Deductive approaches

Inductive approach is a method of reasoning that seeks to develop new theory from the empirical evidence observation (Bryman and Bell, 2003). The process commences with observations while theories are proposed at the end of the research. In order to reach conclusions, regularities in experience and patterns are observed (Hussey and Hussey, 2015). However, truth of the conclusion in inductive research may be probable, based upon the evidence provided or given. Inductive reasoning is associated with interpretivism and qualitative research (Denzin and Lincoln, 2013; Saunders et al., 2015).

However, Deductive approach emphasises theory testing through empirical observation. It encompasses formulating a hypothesis based on pre-existing theory, logical deductions from sets of inputs propositions as well as obtainable evidence, and a research strategy is designed in testing the formulated hypothesis. The propositions could be assumptions which the researcher is examining, or believes in (Saunders et al., 2015). Deduction is reasoning from the 'specific' to the general. Deductive reasoning is associated with quantitative method, positivist research, and natural science pattern of social research (Bryman and Bell, 2011).

4.4.3 Justification for choice of research strategy

This study adopts positivism, quantitative method, and a deductive approach. As highlighted in Table 4.1, the ontology of a research could be either subjective or objective. Therefore, it is appropriate that a positivist epistemology be considered. More so, the corresponding methodology

will be quantitative. The study identified research questions and propose hypotheses from the extant literature and from already existing theories (Forza, 2002). It is on the assumption that there are sustainable practices whose adoption by firms can enhance their performance, and that these practices are quantifiable and measurable. When a research involves attributes that are quantifiable, it is particularly suitable to use survey by questionnaire (Collis and Hussey, 2003). Thus, survey using a questionnaire is employed in collecting data. Survey by questionnaire is the predominant approach adopted by supply chain management researchers (Forza, 2002). It is majorly employed in situations where the attributes within a study could be explicitly outlined and generally comprehended, and in exploring relationships between variables (Saunders and Thornhill, 2003).

4.5 Research design

Research design is a plan or blueprint used in the measurement, gathering, and interpretation of the information collected, with the aim of answering the proposed questions of a study (Sekaran and Bougie, 2016). It is a strategy which researcher selects in order to combine the different elements of the study in a comprehensible way, to effectively address the research problems (Saunders and Thornhill, 2003). Three kinds of research designs exist, namely, explanatory, descriptive, and exploratory research (Saunders et al., 2015). Nonetheless, it is feasible to get all these three categories in combination. Exploratory research uses focus group interviews or literature review in identifying key problems and variables, or in formulating hypotheses for additional research. Descriptive research aims at obtaining a precise description of observations of phenomena under study. Finally, explanatory research also known as confirmatory research seeks to give an explanation of the interrelationships present among variables (Saunders et al., 2015).

The following section presents the questionnaire design, survey instrument pilot testing and highlights of the recommendations from the pilot study, sample selection, and questionnaire administration.

4.5.1 Questionnaire design

This study adopted exploratory survey research. Before the questionnaire design, a comprehensive review of extant literature on sustainable supply chain management, organisational factors (culture, quality of management, and size), and its effect on business performance was conducted. The purpose of the background study was gathering information on the implementation of sustainable supply chain practices in the petroleum industry. Questionnaire was the instrument used in collecting data. The questionnaire is a standardised list of questions, which when answered by an appropriate respondent, can help a researcher to understand the attitude, behaviour, or beliefs of individuals. The data is collected without the researcher's presence, but essential in examining insights within the minds, opinion, experience, attitudes, and knowledge of the respondents (Easterby-Smith et al., 2015). The design process for the questionnaire used here was adopted from Sekaran and Bougie (2016; p. 145) and amended by the researcher. Figure 4.1 below shows the three-step design process.

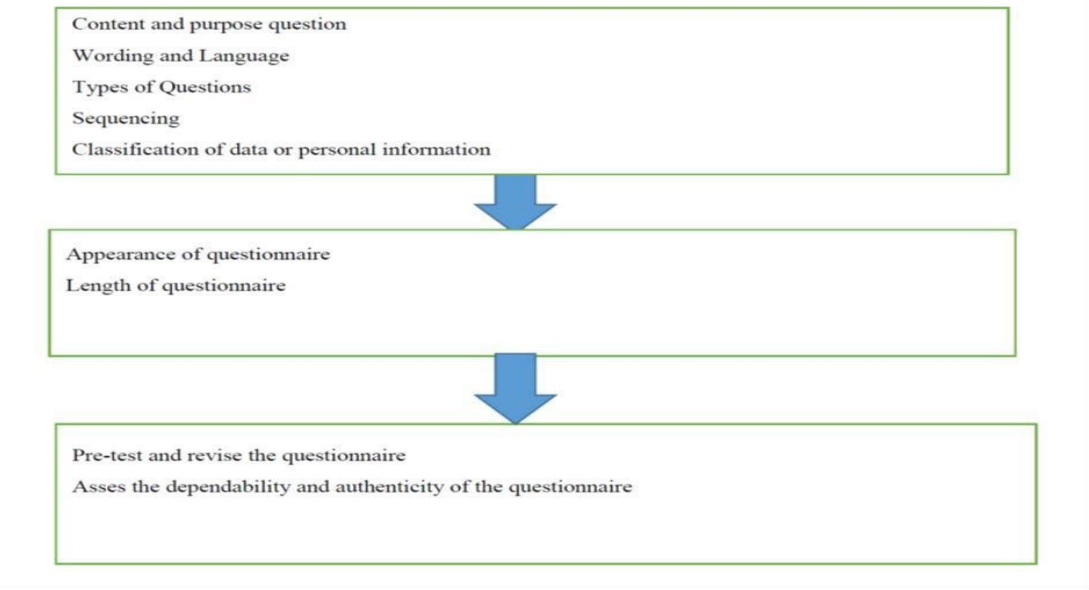

Figure 4. 1: Design process of a questionnaire (Sekaran and Bougie, 2016; page. 145)

Step 1: Wording principles

The principle of wording is a vital step in designing a questionnaire, thus, the wording indicates the reception of desired information. Hence, five factors or principles need to be observed namely, how appropriate is the content of the questions, the manner at which the questions are worded together with degree of language sophistication, the sequence of the questions, the kind of questions asked, and the personal data required from the respondents.

Content and purpose of questions: This serves as the research's aim. Sekaran and Bougie (2016), states that the mode of the questions should be made plain whether with objective or subjective facts. In this questionnaire, the questions asked are objective in nature and gotten from the sub-questions of the research as well as the literature to ascertain attributes and variables regarding the adoption of sustainable supply chain practices by firms. Creswell (2009), states that cracking up the research questions is most appropriate for a questionnaire design because it helps in producing valuable results.

Wording and Language: The wording of questions has a potential influence on the response rate (Conley, 2002). Wordings in questionnaire should estimate the general degree of understanding of the respondents. In that regard, it is important to use a simplified wording and language that can understood by the respondent. If a respondent could not understand some questions, the researcher will certainly get incorrect answers, and responses obtained will thus be biased (Sekaran and Bougie, 2016). The supervisor reviewed the wording and language of the questionnaire, and recommendations were made. Accordingly, the questionnaire was refined in order to ensure ease of understanding, and to tap the elements and dimensions of the key research concepts.

Types of questions: Survey questions come as open-ended or close-ended questions. For questions that are open-ended, respondents are given the liberty to respond to questions in any manner they wish. Conversely, closed-ended questions expects the respondents to select from different alternatives provided by the researcher (Sekaran and Bougie, 2016). The questionnaire used in this study to collect data comprises of close-ended questions upon which the participants select their responses from a variety of answers provided. The stipulated options to response from for the close-ended questions are mutually exclusive and exhaustive.

Scale question: In this study, relative scores of 1-5 as provided by Likert Scale (Oppenheim, 1992) are utilised for perceptual data of survey questions. Here, score one (1) stand for "low", three (3)

represents “moderate”, whereas five (5) means “very high”. Even though rating scales are prevalent in research questionnaires of social science, the scales are prone to a number of biases and often have limitations. Meaning, the questionnaires are prone to what is termed response bias (Krosnick, 1991). Many respondents will normally accept the assertion given irrespective of its content. Considering its prevalence, researchers should carefully choose the particular point to be given on a rating scale while using this measurement technique.

There is no consensus among scholars on the desired number of points that ought to be considered in a rating scale. Likert (1932) suggested that rating scales have to give five points (1-5), recently, Dawes (2008) observed that comparable responses can be detected from seven to ten (7-10) point scales, which has the potential of producing better information than what a shorter scale, say of 1-5 would. The psychometric literature advices that using high scale points is advantageous even though there is a declining return when eleven (11) points is reached as observed by (Nunnally, 1978). Nonetheless, empirical evidence has confirmed that information from Likert items and those with related scales rating turn out to be more inaccurate or erroneous when the number of points becomes less than five or the numbers are above seven (Johns, 2010). Hence, much of the argument has been about whether to use five-point scales or to use seven.

Symonds (1924) was notably the earliest scholar who proposes that the reliability of a rating scale is improved when the responses reaches seven options, and many subsequent studies largely accepts the proposition (Colman et al., 2011). Similarly, Miller (1956) maintained that the mind of we, humans has absolute judgement span which can differentiate about 7 different options, thus when the number of response categories exceeds seven, it may become counter-productive. While a number of researchers emphasise the use of 7-points for increasing the measurement variance e.g. (Colman et al., 2011), others have argued that when the measurements are increased, it becomes susceptible to distortion owing to extreme score bias, as several participants are incapable of responding to very high or very low points (McKelvie, 1978).

In respect of this, many studies have shown that 5-point rating scales have higher reliabilities (Colman et al., 2011; Sekaran and Bougie, 2016). In view of that, 5-point scale, not the 7-point scale was used in this study because of the practical considerations, which includes simplicity in item preparation, shortness of administrative times, and reduced costs of administration. Earlier research on this, shows 5-point scale is easily understandable to participants, it also equips them

to state their opinions and views on a phenomenon (Sinclair, 1975). A 5-point scale is less confusing and vital in increasing responses rates. It is quite simple to state the whole of list of scale descriptors. For instance, one(1) denotes strongly disagree, and two (2) signifies disagree (Dawes, 2008).

Sequencing: Sequencing in a questionnaire, refers to the order of questions, it is vital as it enables a respondent to answer the questions with little or no problems (Sekaran and Bougie, 2016). The questions should start from a general nature question, down to more specific questions. Similarly, it goes from questions which can be easily responded to, to others which are relatively more difficult in responding. This method is known as the funnel approach (Furfey et al., 2007). While sequencing the questions, researchers should not put words that are contiguously positive together with a negatively worded question that taps the same element of a concept (Sekaran and Bougie, 2016). Thus, the "Funnel approach" employed in this study commences survey questions with broader issues at industry and market level before being narrowed down to company level details.

Classification of data or personal information: It is important for the researcher to collect key demographic information such as company name, position of the respondent, company's years of establishment, number of employees, and business sectors. Some Scholars have proposed that although the theoretical framework may not include the company's information, it has to be asked, since such information facilitates in describing as well as enhancing the sample characteristics after analysis (Bryman and Bell, 2015; Sekaran and Bougie, 2016). Considering that the survey was carried out in two countries (Nigeria and UK), this questionnaire includes some demographic details, such as number of employees, business sectors of companies, and operational scope.

Step 2: Planning

Planning principle relates to the overall questionnaire feature. It is about the questionnaire appearance and its length.

Questionnaire appearance: The arrangement and sequence in the questionnaire qualifies the respondents to respond to the questions in a manner that is both easy to read and easy to reply (Sekaran and Bougie, 2016). This has been considered taken to prevent poor layout and format in the questionnaire. Accordingly, an appealing introduction, instructions that are well-organised, and proper questioning alignment were ensured in order to improve the questionnaire appearance.

Length of the questionnaire: This is of considerable importance. A questionnaire should comprise of simple and short questions (Sekaran and Bougie, 2016). As a 'rule of thumb', wordings in any question most not surpass twenty (20), while the number of pages in the questionnaire should not be more than ten (10). Additionally, the manner in which the questionnaire is structured is also a vital issue (Ross, 2005). The questionnaire used in this study was structured to minimise the time expected to finish, avoiding difficulties and loss of interests from respondents. As a result, the questionnaire has six (6) pages and all questions are on a five Likert scale, thereby enabling multiple response choice.

Step 3: Pilot testing

This is a crucial part in questionnaire design (Creswell, 2014). Pilot studies are referred to as feasibility studies carried out before a major study or a pre-test of the research instrument (Lancaster, 2015). The primary aim of this pilot test is obtaining advance insights for the viability of the study, and to evaluate whether the planned instruments and approaches are suitable. By conducting the pilot study, a researcher can assess the differences between the way he/she views particular measures and that of the respondents (Sekaran and Bougie, 2016). Pilot testing can be conducted for quantitative and qualitative studies, as well as in testing a research procedure, e.g., the various modes of administering the questionnaires and receiving them from respondents.

Simon (2011) has suggested a set of processes for pilot study and enhancing the internal validity of a survey instrument. These processes comprise of distributing the questionnaire to the pilot participants similar to what is done in the final study, asking for feedback from pilot subjects concerning difficult questions if any, keeping note of time spent in completing the questionnaire to assess if it is reasonable or not, and removing questions that are unnecessary. Others covers evaluating the range of responses for the questions to decide if they are satisfactory, re-wording of questions not properly answered, shortening and revising questionnaire, as well as repeating pilot testing.

In this study, the questionnaire used was pilot tested prior to the main survey. The purpose the pilot testing was identifying areas needed to be modified in the questionnaire so that the participants can easily answer the questions without difficulties. The drafted questionnaire was distributed to 20 participants including academics at University of Central Lancashire (UCLAN), and industry experts. An overall response rate of 95% was obtained since the researcher selected

only the participants that promised the completion of the questionnaire. Some useful feedbacks and recommendations about the questionnaire design were received from the pilot subjects. The feedbacks received are summarised below:

- 95% of participants said the wording and language used in the questionnaire was understandable and straightforward.
- 90% of the participants said the sequential order of questions according to headings and use of multiple options for the questions made it easy to answer.
- 30% of the participants complained about the length of the questionnaire as they spent more time in completing it than stipulated in the covering letter.
- 60% of the participants suggests that the supporting covering letter should contain a brief synopsis of the study.

Consequently, before the commencement of the main survey, the questionnaire was refined and updated based on the suggestions from the pilot study.

4.5.2 Sample selection

Bartlett et al., (2001) describes a sample as the group of units in a given population, it is regarded as the real representation of the population. The primary sampling techniques in social science research includes probability as well as non-probability sampling.

Probability sampling refers to the selection procedure in which all components in a given population exhibit equal chance of being chosen in the sample, with a mathematical probability that each of the sample selected can be evaluated. There exist two major kinds of probability sampling namely: systematic sampling and simple random sampling. In systematic sampling, participants are selected, beginning from randomly chosen component in the sampling population before picking any nth component. For instance, commencing from a random point in a phonebook then proceed by picking any 50^{th} number. Simple random sampling refers to a portion of population where every component in the subset has the same possibility of being selected in the sample.

Non-probability sampling entails choosing population components based on their availability. For example, volunteers in a project. However, the negative effect of this technique is that an unknown

fraction of the population is not included, particularly members who did not volunteered. Convenience sample is the commonest type of non-probability sampling. It is not always easy to recruit participants, but it enables a researcher to use the people that are available rather than choosing from the whole population. In that regard, a portion of the population has no opportunity of being selected. As a result, the degree to which a convenience sample represents the whole population cannot be calculated.

In this study, three (3) databases were used in choosing respondent companies from sample frames, including Financial Analysis Made Easy (FAME), Subsea Oil and Gas Directory, and Nigeria Business Directory. The sample was selected randomly way to control bias, as suggested by (Sekaran and Bougie, 2016). A simple random sampling technique was employed to give each company equal opportunity to be chosen in the sample. Nonetheless, convenience-sampling approaches were similarly adopted in choosing the people to answer the questionnaires in the sampled organisations. This is because convenience sampling enables the selection of respondents based on their accessibility and expertise (Easterby-Smith et al., 2015). In other words, convenience sampling allows a researcher to choose the most convenient people that should serve as respondents to the questions. Supply chain managers were selected as potential respondents of this study, as they are best suited in providing the required information about the adoption of sustainable supply chain practices in their companies.

Some scholars have proposed that samples should be real representative of the population (Bartlett et al., 2001; Saunders and Thornhill, 2003). This study seeks to give general overview from a sample up to population; thus, the representation in a sample is of considerable importance. Accordingly, companies from all the segments of the oil and gas industry (downstream, midstream, and upstream) are analysed, which ensures the ability to generalise and extend research findings to include a larger amount of companies in the population. Maylor et al. (2017), states that an inclusive generalizability must involve all the distinctions within the population which are in equal magnitudes as in the population. Thus, this research has collected data from firms operating in the upstream, midstream and downstream segments of the industry to account for the distinctions, and therefore enhance generalizability.

4.5.3 Questionnaire Administration

A questionnaire can be administered through different ways, such as post, online, and telephone. The choice of any mode of administering questionnaire is based on a number of factors which include cost, efficiency, speed, internet availability, as well as sensitivity to the questions (Faught et al., 2004). Even though postal questionnaire is advantageous in that it can easily reach the target respondent alongside other mails, it is associated with low response rates (Sekaran and Bougie, 2009). Online questionnaires are efficient and less expensive to administer, but when sent through email addresses that are solely for business-related enquiries, they could be perceived as an unwanted email by the recipients and hence might not be responded (Flick, 2015).

In light of the drawbacks associated with each mode of administering questionnaire, Edwards et al. (2009) suggests combination of online and postal questionnaires in order to improve efficiency and response rates in surveys. In selecting the method of administering questionnaires, many factors including efficiency, speed, cost, dispersed nature of the sample population, and response rate were carefully considered. Accordingly, both online and postal questionnaires were adopted in this study, as recommended by (Edwards et al., 2009).

4.6 Data

This section contains a description of the different types of data, as well as parametric and non-parametric tests. Survey by questionnaire was the method of data collection in this study.

4.6.1 Response rate

Response rates for many types of surveys have decreased in recent years (Curtin et al., 2005). This decline in response rates has triggered much anxiety between social scientists on the validity of findings from studies having low response rates. It is believed that the response rate defines the degree whereby the final data set is composed of all members in the sample. High response rates indicate that the survey outcomes are representative of the target population. Thus, high response rate is essential in order to produce accurate results that can be generalised to a larger population. Here, many techniques were employed in improving the response rate. Firstly, the "Total Design Method" (TDM) comprising a set of procedures for avoiding poor formatting, illogical sequence,

and repetition, was used. Secondly, the "Funnel approach" of commencing survey questions beginning from broader industrial and market level issues before it is narrowed down to firm level was deployed. Lastly, email reminders were sent to the respondents, and phone calls were also made. Meanwhile, the cover letter attached to the questionnaire bears the name of Director of Logistics Institute at the University of Central Lancashire to motivate the respondents to fill the questionnaire.

4.6.2 Data analysis

In a research process, all forms of data collected are analysed to ascertain whether the evidence or information supports the proposed hypothesis and to answer the research questions. For that reason, it is vital to understand the kinds of tests that are appropriate for a particular kind of data (Maylor et al., 2017). Data analysis in social science research has multiple facets, comprising a number of techniques under different names. These techniques include the following: data processing, modelling, inspection, cleaning, transformation, and presentation with the aim of deriving valuable information and conclusions (Saunders and Thornhill, 2003).

4.6.2.1 Data types

There exists 4 quantitative data types (nominal, interval, ordinal, and ratio), and understanding of the differences between these categories is of considerable importance, because it affects what they mean and what a researcher can do with them (Maylor et al., 2017). In other words, the type of data obtained is essential to determine the method that would be used for analysis. In this study, the collected data in the survey was inspected, and the types of data were accordingly categorized. This was conducted using SPSS. SPSS is efficient statistical software that can evaluate complex data manipulation and analysis. The data, then grouped into four (4) types: thus, nominal, interval, ordinal, and ratio data. Nominal data classifies an element or attribute in no default sequence (e.g., male or female). Ordinal data use a sequential order unlike nominal data but does not have a numerical meaning beyond the sequence (e.g., non-numeric concepts measures such as satisfaction). However, interval data uses numeric scales in which the sequence and exact differences among the values are known (e.g., working out the difference between 30 and 20 degrees to be 10). Ratio data provide the sequential order as well as definite value amongst units, and this permits the application of various inferential and descriptive statistics (e.g., height and weight).

4.6.2.2 Data entry

All types of quantitative data should be recorded through numerical codes. This is to enable the researcher input the data quickly, and it makes subsequent analyses easier, especially those that requiring re-coding of data to form new variables (Bryman, 2012). Converting words to numbers makes data entry more accurate. For instance, instead of typing in 'strongly agree' each time it has been ticked by a respondent, the researcher can type '1'. This assumes that one (1) relates to strongly agree (Maylor et al., 2017). It is important for the researcher to transfer data to a consistent electronic file for future analysis (Forza, 2002). Thus, all variables were coded using specific labels, and data was entered as numbers into a SPSS file. In order to ensure that data are entered correctly, the researcher double-checked the SPSS file with the original responses.

4.6.2.3 Parametric and Non-parametric

Parametric procedures predict a certain distribution of the data (generally the normally distributed. It assumes measurements at intervals, and uniform variances for comparing two or more samples. The t-tests and f-tests are common examples of parametric tests (Altman and Bland, 2009). Nevertheless, Cohen (1988) observed that when parametric assumptions are moderately violated, it results in small to no effect on substantive conclusions in majority of cases. Non-parametric tests do not suppose that the data follow a particular distribution. Non-parametric tests are often applied in a situation where data is not normally distributed (Altman and Bland, 2009). The presence of outliers can affect the normality distribution of a data set (Lu, 2009). In the context of this research, parametric tests are often used since they have more statistical power. Hence, it is more often for the researcher to identify the existence of significant effect. For their low statistical power, non-parametric tests are less sensitive.

4.7 Data analysis outline

Data analysis outlines the statistical methods used in answering the research questions. The basic features of this data were described using descriptive statistics. Standard deviations and means were used to summarise the samples and measurements. Three (3) major inferential statistical techniques were applied in addition to the descriptive statistical techniques mentioned earlier to

address the research questions. These include Correlation analysis, Regression analysis, and Structural Equation Modelling (SEM).

4.7.1 Correlation analysis

Correlation technique measures the extent of relationship existing between two variables. The correlation coefficient, symbolised by the letter '***r***' has range of -1 to +1, these values indicates relationship strength while the sign (- or +) shows the direction of association. Therefore, when the value of correlation coefficient approaches -1, it means strongly negative association whereas a value close to +1 implies strongly positive association, these are practically termed indirect and direct linear relationship among variables (Cohen and Cohen, 2003). To ascertain the relationship between two variables, say X and Y, the formula below is used:

$$r = \frac{\Sigma(X-\overline{X})(Y-\overline{Y})}{\sqrt{\Sigma(X-\overline{X})^2}\sqrt{(Y-\overline{Y})^2}}$$

Where, $\overline{X}$ = mean of X variable
$\overline{Y}$ = mean of Y variable

4.7.2 Regression analysis

Regression analysis is one of the most popular multivariate statistical techniques for analysing data which is composed of various factors. In this technique, the researcher can use either a simple linear regression or a multiple regression analysis in answering research questions. Simple linear regression analysis is preferred when there is one independent variable affecting a dependent variable. Conversely, multiple regression analysis utilises the use of two or more independent variables in explaining variance in the dependent variable (Sekaran and Bougie, 2016). For this research, a multiple regression analysis was applied, which greater than one independent variable. The primary purpose of regression analysis is assessing the relationships between one dependent variable and sets of independent variables. Regression analysis is different from correlation analysis as it gives prediction and explanation of research variables (Kilic, 2013). Basically, regression models have unknown parameters (β), the dependent variable (Y), and independent variables (X), and. Thus, when a value of 'x' is given in a regression equation, the corresponding

values of 'y' can be predicted, both 'y' and 'x', representing the dependant and independent variables respectively refers to two sets of measures for a sample size 'n' (Dudovskiy, 2018). The regression formula is estimated as follows:

$$y^* = a + bx$$

Where,

$$b = \frac{n \sum xy - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

$$a = \frac{\sum y - b \sum x}{n}$$

Before conducting the regression analysis, certain assumptions and criteria should be met. Multiple regression analysis requires the normal distribution of variables. Similarly, multicollinearity should not exist among the variables. The test for normality undertaken earlier shows no significant deviation from normality by the variables. In regression model, multicollinearity occurs when the correlation between the variables is high. In this study, the correlation coefficients calculated between the pairs of variables are all less than 0.7, thus, very low. Therefore, in this regression analysis, multicollinearity is not a problem. Fidell et al., (2006), states that multicollinearity becomes a problem in a situation where the correlation coefficient between variables is in the region of 0.7 to 0.9, this indicates an absence of multicollinearity in our case.

4.7.3 Structural equation modelling

Structural equation modelling (SEM) has recently become a common technique for data analysis for empirical operations and SCM research (Shah and Goldstein, 2006). SEM refers to "a family of statistical models which is aimed at explaining the relationships that exist among multiple variables. From this, the interrelationships structure are examined in equation series, analogous to series having multiple regression equations" (Hair et al., 2010). SEM is often applied when measurement together with structural model are to be tested at the same time, and where multiple separate regression equations need to be simultaneously estimated (Shah and Goldstein, 2006). In

structural equation modelling (SEM), the emphasis is mainly on latent constructs – abstract variables such as "culture" as opposed to the individual or manifest variables used in measuring these constructs. SEM is a wide-ranging statistical modelling technique comprising of multiple regression analysis as well as factor analysis. Usually, SEM is employed to assess association amongst latent constructs and manifest variables. This technique provides an estimate of multiple as well as interrelated dependence in one analysis, it also provides for variables not measured directly (latent constructs). Accordingly, researchers pursues unbiased estimates of the relationships existing between latent constructs (Hair et al., 2010).

Structural Equation Model is regarded as the most efficient method used to determine and interpret the associations between latent constructs and observed variables. Latent construct is akin to a real score that is not observed directly, the observed variables are the measures that are observed directly, and some extent of random measurement error might occur in a way where the noticed score could not effectively equal the real score (Hair et al., 2010).

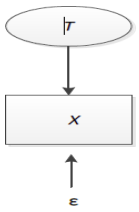

Figure 4.2: Path model

SEM produce a variety of statistics, including model fit test, estimates of individual parameters, regression coefficients that are non-standardized, standard errors for those coefficients, a regression coefficient that has been standardized, and *R2* for the regression equation. SEM is considered as most commonly used technique to establish dependency relationships in the social sciences. In this study, AMOS software was used. This software was designed for structural equation modelling and other complex statistical analyses. This study employs structural equation modelling for path analysis or causal modelling, which gives hypothesis of causal associations among variables and examines the causal models using equation systems that are linear. To test causal models, either manifest variables or latent variables is involved, or their combination of

both. In reporting of SEM results, the guidelines suggested by the following scholars were followed in this study (Hoyle and Panter, 1995; Boomsma, 2000).

4.7.3.1 Model fit assessment

The general fitness of the structural model to the data is assessed by the chi-square statistics tests. The null hypothesis tested shows that the model and the data have a good fit, thus researchers expect to have a low and insignificant value of chi-square, which is a sign of good model fit. On the other hand, sample size sensitivity and violation of multivariate normality assumption are part of the characteristics of chi-square test. Therefore, this should not be observed as the only criteria in judging model fit (West et al., 1995). Some scholars suggest the evaluation of different indices concurrently in order capture all the categories of model fit assessment criteria (Mueller, 1997; Suhr, 2006; Blunch, 2012).

In SEM, there are three basic classifications of descriptive fit indices: overall model fit descriptive measures, descriptive measures of model parsimony, and descriptive measures based on model comparisons. The first classification involves four attributes Root Mean Square Residual (RMR), RMSEA, which means Root Mean Square Error of Approximation, NFI and NNFI meaning Normed Fit Index and Non-Normed Fit Index respectively. The second classification which is based on model parsimony comprise of PGFI and PNFI, for Parsimony Goodness-of-Fit Index, and Parsimony Normed Fit Index accordingly. For model comparisons, the descriptive measures consist of GFI, the Goodness-of Fit Index, CFI, Comparative Fit Index, and AGFI, Adjusted Goodness-of-Fit Index. For the purpose of this study, only RMSEA, Root Mean Square Error of Approximation mentioned in the overall model fit, and CFI, Comparative Fit Index from description based on model comparisons were selected as supporting evidence of the model fit.

- **Root Mean Square Error of Approximation (RMSEA) –** The RMSEA gives approximate fit measurements in the population and is thus based on the differences following approximation (Steiger, 1990). When the RMSEA value is less than 0.05, it is regarded as a good fit (Browne and Cudeck, 1992). As a cut-off criteria, Hu and Bentler (1999) recommended that an RMSEA value be less than .06

- **Comparative Fit Index (CFI)** –This is one of the fit indices that is rarely affected by sample size, a value of 0.9 - 0.97 of CFI is considered a good fit. (L. Hu and Bentler, 1999; McDonald and Bollen, 2006).

4.7.3.2 Model fit evaluation

Even though structural equation modelling generates numerous fit indices, to discuss all of them will be superfluous. Hair et al. (2010) states that after running a SEM analysis, it will then become appropriate to use three to four indices in providing an evidence of model fit. Nonetheless, not entire recommended three to four that would be reported because of the chances of overlap among the various indices. Here, supporting model fit evidence is rendered by the CFI and RMSEA. These two were selected due to their sensitivity to model specifications, and they are independent on sample size like the chi-square test (L. Hu and Bentler, 1999). Other fit indices such as AGFI and GFI were not chosen because they largely depend on sample size.

After obtaining a structural model which fits well with the data, tests of significance, together with parameter estimates are then interpreted for each parameter. Standardized regression coefficients values were related to each path. Visual display of the parameter estimates was provided by the path diagram outputs. Accordingly, given a standard deviation, the degree of a unit changes in the independent variable, otherwise called the Predictor, is represented by the amount of change in the value of the dependent variable, which is called the Outcome. For values of R-square with a range of 0 to 1 to be displayed, 0 means that the independent variable (***X***), cannot be used to predict the dependent variable (***y***) while 1 means that the independent variable (***X***) has the perfect ability of predicting the dependent variable (***y***). Lastly, tests of individual significance for each parameter estimates are interpreted.

4.8 Justification for choice of statistical techniques for data analysis

Correlations, regression analysis, and SEM are the key techniques used in this research. Correlation coefficient was utilised since it was ideal to measure the extent of association between any two variables. Thus, the relationships between the research variables were examined using correlation coefficients. Direct influence of organisational culture, quality of management, and SSCM practices on business performance was assessed using regression analysis. While SEM was

used in assessing the indirect effects of these variables on performance. SEM's capacity in dealing with latent variables has made the technique the perfect tool for examining relationships among constructs examined indirectly. Similarly, SEM explains measurement error in different estimation of parameters, which allows researchers to have an impartial relationship estimates among observed variables.

4.9 Conclusion

Synopsis of research philosophy and methodologies of the research were given in this chapter, justification for the chosen methodologies was also made. Additionally, the statistical techniques adopted for data analysis were discussed.

Going forward, chapter 5 will present the result of survey by questionnaire. The questionnaire was used to obtain responses from supply chain managers in the oil and gas industry. Supply chain/operation managers were mainly considered because they are deeply involved in key operational issues within their firms. The survey specifically elicited perpetual information regarding the implementation of SSCM practices and the role organisational factors play in that regard, and the overall effect on business performance. Questionnaires were formulated and circulated for data collection, the result obtained was used to observe whether the earlier proposed hypotheses were valid or not, through the responses obtained from the research questions. Furthermore, chapter 5 also seeks to obtain the validity of the research model through questionnaire survey.

Chapter 5: Survey by Questionnaire

5.1 Introduction

This chapter presents the design, planning and administration of the questionnaire survey. Additionally, the scores of the descriptive statistics and results of the inferential statistics are also reported. The main purpose of the survey was to collect data to examine and test the relationships indicated in the conceptual model and research hypotheses specified in chapter 3. In order to test the hypotheses proposed in chapter 3, the relationships between the main research constructs of organisational culture, business size, QOM, SSCM practices, and firm performance were examined using correlation analysis. In addition, regression analysis and structural equation models were used in assessing the causal effects of the independent variables on the dependent variables, which is firm performance.

There are two themes in this study; the first determines the influence of organisational factors on SSCM practices in the context of the DCV and RBV, which provide a robust perspective on how a firm's capabilities and resources can facilitate the adoption of SSCM practice. The second theme empirically establishes the effects of SSCM practices on performance based on the position of the PBV, which holds that practices may account for differences in performance among firms. Accordingly, a survey design was adopted to carry out the study and obtain novel insights on the two research themes. A survey by questionnaire, which is a deductive research technique, was considered suitable for the current study. Thus, data was collected to test the relationships between the theoretical constructs and answer the research questions. To improve the validity of results and reduce error, appropriate processes of designing and administering the survey as well as data analyses were followed (Creswell, 2014).

5.2 Questionnaire Design

In designing the questionnaire, the comprehensive approach was adopted, as recommended by a number of researchers (Mishra, 2005). The comprehensive approach, also known as the Total Design Method, is generally considered as an effective framework for designing online, postal surveys, and mixed-mode surveys. In this study, the TDM was adopted in the questionnaire design stage. TDM utilises the social exchange theory in determining means of enhancing the overall response rate of surveys. It puts emphasis on planning the data collection procedure in a manner that seeks to persuade participants that the advantages of participating are more rewarding than the costs of doing so. In TDM process, researchers outline a range of questions they will ask, while considering the data type, the study's questions to be answered, and data analyses technique.

The questionnaire was distributed to numerous companies operating in the O&G industry. The questionnaire was designed to assess the relationships of organisational characteristics (culture, size and QOM) with SSCM adoption, and performance outcomes of its implementation. The questions were mostly made up of close-ended and Likert-scale driven questions, where the respondents pick an answer from a given number of options, or rank their responses according to a scale, respectively. The response options for the closed-ended questions were exhaustive and mutually exclusive. A cover letter soliciting for participation of organisations accompanied the questionnaire when distributed.

The questionnaire consists of 22 questions, which were classified into four sections: General information, SSCM practices, organisational factors, and organisational performance. The first section involves the demographic information of the participants, such as names of the responding companies, position held by the respondent, total number of staffs in the firm, the year the organisation was established, companies' annual turnover, and the different business sectors the company operates in. The second section obtained information on the SSCM practices that have been implemented by the responding firms, where the respondents were asked to rate the degree to which their organisations have implemented sustainable design, sustainable procurement, sustainable distribution, investment recovery, and social sustainability practices. The third section solicited the views of the respondents concerning organisational culture and QOM in their firms, as well as the extent to which the size of organisation influences the implementation of SSCM practices. The fourth section obtained information on the extent to which responding firms

achieved improvements in economic, environmental, social, and operational performance during the past year. The questionnaire used in this study is attached in Appendix A.

5.3 Questionnaire administration and response rate

Seven hundred and forty (740) questionnaires were emailed to potential respondents (370 UK and 370 Nigeria) taken from the subsea oil and gas directory, Nigeria business directory, and Financial Analysis Made Easy (FAME) database of companies. Out of the 740 companies sampled and sent questionnaire, 213 responded to the survey, making the response rate 28.7%, which is deemed to be representative of earlier studies of organisations by questionnaire. In a previous similar empirical study on SSCM, Luthra et al., (2016) achieved a response rate of 24.6%. Out of 213 questionnaires returned, 192 were completed fully, with logical answers. These 192 were deemed usable for analysis, whereas the other 21 questionnaires were rejected for further analysis as they were partly completed. Although poorly completed questionnaires provide some information, scholars suggest their exclusion from analysis so as to minimise the rate of missing data, and thus enhance the validity of findings (Creswell, 2009). The 192 responses used for final analysis have a response rate of 25.9%. It should be noted that, out of the 192 responses, the UK O&G companies account for 100 responses while Nigeria O&G firms account for 92 responses. Table 5.1 shows that the response rate obtained in this research is in line with those reported by previous empirical studies on SSCM practices.

Table 5. 1: Response rates reported by previous studies on SSCM

Authors	Response rate
Paulraj et al. (2017)	18.5%
Luthra et al. (2016)	24.6%
Sambasivan et al. (2013)	30%
Wagner and Blom (2011)	17.1%
Sarkis et al. (2010)	13.7%
Zhu et al. (2008)	13%

5.4 Statistical Results

In order to conduct statistical analysis of the data collected, the responses of the questionnaire were inputted into SPSS using specific allocated codes that represents the respondents' answers. The SPSS enables the computation of simple descriptive statistical analyses such as frequencies, means, standard deviation, and other complex inferential statistical analysis including Regression, T-test, Chi-square test for association and much more. The SPSS software is one of the most commonly used tools for data analysis in operations and SCM research due to its efficiency and effectiveness.

5.4.1 Normality assessment

Before conducting statistical analyses, it is essential to check the characteristics of distribution of data, in order to ascertain the extent to which variables are normally distributed. Certainly, the assumption of normality is a precondition for conducting multivariate analysis (Saunders et al., 2015). Normality is described by a bell-shaped curve, which has the highest frequency of scores in the centre with smaller frequencies at the ends (Frederick and Wallnau, 2011). There are various ways of testing normality in a data set including histogram, box plot, Kolmogorov-Smirnov (K-S) statistics with Lilliefors significance level and Shapiro-Wilk statistics, measure of skewness and kurtosis, and the analyse and explore option in SPSS (Pallant, 2011). For the purpose of this study, normality of the data set was assessed using histogram, Kolmogorov-Smirnov (K-S) statistics with Lilliefors significance level and Shapiro-Wilk statistic, and normal Q-Q plots.

5.4.1.1 Histogram

Histogram is a statistical chart, which is utilised in assessing a dataset's distribution (Pallant, 2011). In this respect, the histogram was used to check the normality of the data set, particularly the main research constructs. The actual shape of the distribution for SSCM practices, organisational factors (culture, size and QOM), and organisational performance were examined and presented below. However, reporting all the histogram charts will be superfluous and thus only aggregate SSCM practices and organisational performance were reported.

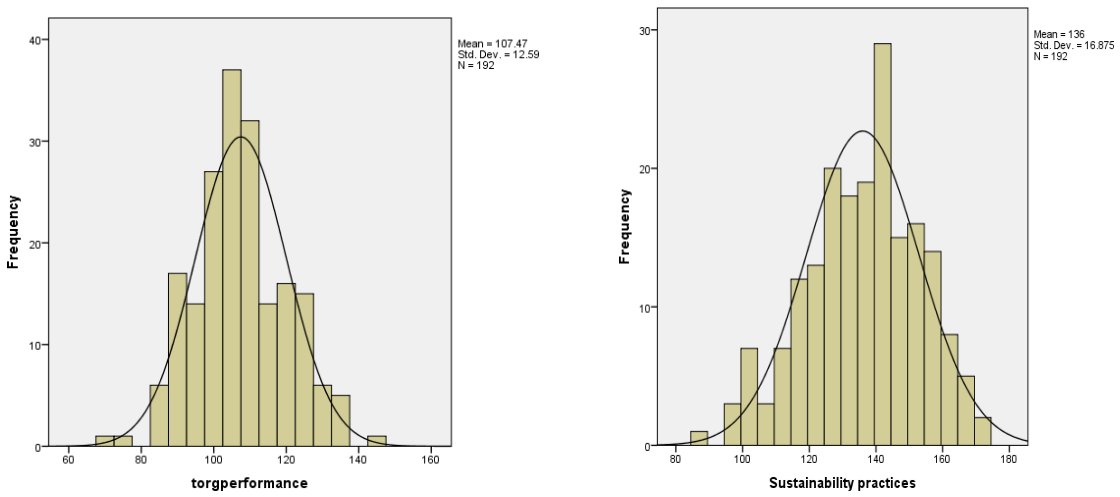

Figure 5. 1: Histogram of organisational performance and SSCM practices

Figure 5.1 shows the histogram of aggregate organisational performance and aggregate SSCM practices. It is evident that the two variables have distributions that are believed to be normal. Nonetheless, the evaluation of the other characteristics is required in order to understand the type of the distribution in our data set.

5.4.1.2 Normal probability plots

The main purpose of a normal probability plot is to help indicate the type of distribution of a dataset. In other words, it helps explain if a dataset is normally distributed or not. Considering that identifying normality from a histogram may be problematic in some cases, particularly when the dataset is not big, the use of normal probability plot is important in assessing normality in a data set. Consequently, the normal probability plots presented below show that the requirements for normality have been met in our dataset, as the plots are normally distributed.

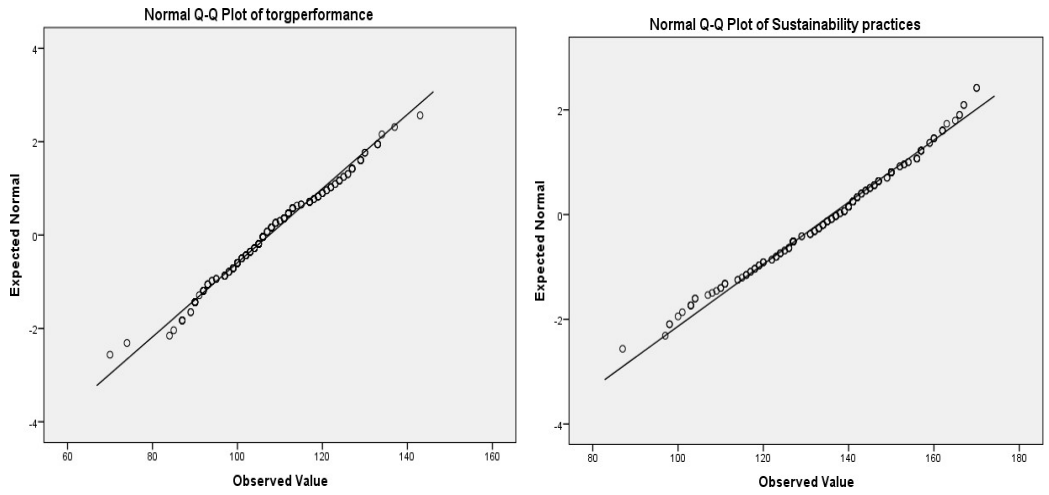

Figure 5. 2: Normal probability plot of organisational performance and SSCM practices

5.4.1.3 Kolmogorov-Smirnov (K-S) and Shapiro-Wilk statistics

Table 5.2 shows the K-S statistics with Lilliefors significance level and Shapiro-Wilk statistics computed for organisational performance and SSCM practices. The results of the test indicate that these variables meet the requirement for normal distribution. Even though two results of assessment of normality are presented here, this does not mean that only two variables were assessed. All the other variables were assessed, and they meet the normality requirements.

Table 5. 2: KS and Shapiro-Wilk statistics tests of normality

	KS statistics			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
SSCM practices	.057	192	.200(*)	.987	192	.001
Organisational performance	.077	192	.208(*)	.989	192	.000

5.4.2 Non-response bias analysis

There are two main approaches of dealing with the potential problem of non-response bias. The first approach involves sending a concise summary of the main questionnaire to non-respondents to complete (Lambert and Harrington, 1990). When their responses are received, a one-way ANOVA is carried out to check the difference between the original responses and the concise

version of the questionnaire. The second approach entails grouping the responses into two categories: first wave and second wave. Thereafter, a test is conducted to assess whether there is a variation between the two categories. This method was chosen in our own case due to the fact that, the likelihood of having the non-respondents to answer the survey and reply back is very minimal in the first approach, considering that several attempts were made to make them respond to the first study, but they failed to do so. Therefore, in the current study, the second approach was adopted. Accordingly, the second batch of the responses was believed to be representative of the non-participant, and t-tests were carried out on the responses of the first and second waves as presented below in table 5.3.

Table 5. 3: Wave analysis to test external validity for non-response bias of the questionnaire

Variable	1st wave	2nd wave	2 tail Sig.	Levene's test
Demographics				
Number of employees	5.68	6.10	0.196 0.194	0.070
Annual turnover	4.94	4.92	0.933 0.933	0.629
Sustainable design				
Eco-labelling of products	3.31	3.50	0.179 0.178	0.883
Use of environmental management systems	3.52	3.54	0.862 0.862	0.845
Cleaner productions	3.34	3.52	0.171 0.171	0.754
Social sustainability practices				
Employee skills development	4.01	4.10	0.406 0.405	0.844
Health and safety training for employees	4.14	4.12	0.828 0.828	0.511
Sustainable working conditions for employees	3.94	4.10	0.122 0.121	0.962
Organisational culture				
Supportive	4.37	4.45	0.421 0.420	0.728
Innovative	4.20	4.27	0.537 0.536	0.707
Flexible	2.81	2.89	0.922 0.922	0.916

The results of the t-test conducted did not indicate any significant variances between the assessed groups. This is supported by the 2-tailed significance value and the Levene's test. From the above

table, the 2-tailed significance values are all bigger than 0.05 for all the assessed variables. Consequently, the null hypothesis that there is no significant difference between mean values of the two waves of responses cannot be rejected. In addition, Levene's test for the equality of variance of the measured variables indicates that the two variances are significantly different. Thus, from Table 5.3, it is evident that in the measured variables, the null hypothesis that there is no significant variation among mean values of the two waves of responses cannot be rejected. As a result, it can be argued that non-response bias did not significantly affect this research.

5.4.3 Validity and reliability analysis

A number of researchers recommend assessing a research instrument to ascertain its quality and validity (Forza, 2002; Saunders et al., 2009; Bryman and Bell, 2015; Easterby-Smith et al., 2015). They maintained that, without assessing validity and reliability, it will not be possible to account for the effects of measurement errors on theoretical relationships that are being measured.

5.4.3.1 Reliability analysis

In order to make sure that questionnaire data is free of random effects, Kimberlin and Winterstein (2008) suggest the evaluation of the reliability of the scales used to collect data in a study. Reliability tests assesses the internal consistency of instruments used in measuring research constructs (Kimberlin and Winterstein, 2008; Sekaran and Bougie, 2016). Measurement items must be highly correlated before they can be considered to meet reliability requirements. The most commonly used technique for testing internal consistency is the Cronbach's coefficient alpha (Cho and Kim, 2015). Accordingly, reliability assessment was conducted for the key research variables, demographics, SSCM practices, organisational culture, business size, QOM, firm performance, and the whole questionnaire. The results are shown in table 5.4.

Table 5.4 indicates that the Cronbach's alpha of the entire questionnaire is 0.736. In addition, reliability test results for each of the sub-items in the survey instrument indicate that all the sub-items have Cronbach's alphas greater than 0.70. Consequently, this mean that there is a strong internal consistency in the scale of the survey instrument. In the literature, the range for Cronbach's alpha value is 0 to 1, and the closer Cronbach's alpha is to 1, the higher the internal reliability. Reliabilities less than 0.60 are rated to be poor, those in the 0.70 range are acceptable and those from 0.80 and above are considered good (Sekaran and Bougie, 2016). Thus, a Cronbach's alpha value of 0.70 or higher is used to establish reliability of a construct.

Table 5. 4: Reliability test results

Variables	Cronbach's Alpha	Number of Items
Entire questionnaire	.736	75
Demographics	.727	7
Organisational culture	.776	16
Business size	.827	4
Quality of management	.932	5
SSCM practices	.791	26
Organisational performance	.829	24

5.4.4 Descriptive statistics of respondents

In the preceding sections, the results of the normality and reliability tests were presented to ensure that the dataset is properly inspected and to determine the extent to which the data satisfies the expectations for parametric analysis. This section presents the descriptive scores of the participants. Table 5.5 shows the descriptive scores of the research variables including their mean, standard deviation, and the minimum and maximum statistics received. The first two columns in table 5.5 show the key constructs and their associated variables. The following columns show the maximum and maximum scores of the respondents, and the remaining columns comprises of the mean, standard deviation, skewness and kurtosis. As shown on the table, the standard deviations indicate that there exists a measure of distribution in the variables measured. In addition, all the skewness and kurtosis do not have high values and at the same time, the scores indicate an equal distribution of both negative and positive values for the nature of distribution of the data. Skewness and kurtosis helps in determining the nature of the distribution of the variables based on the responses received (Fidell et al., 2006; Pallant, 2011).

Even though the mean, standard deviation and correlation are considered as the fundamental techniques for analysing quantitative data, they are not suitable for assessing behavioural patterns multi-dimensional concepts like organisational culture, SSCM, and performance. In this regard, parametric tools like regression analysis and SEM enable researchers to measure complex relationships and interactions between variables.

Table 5. 5: Descriptive statistics of the research variables

RESEARCH VARIABLES		Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Organisational culture	Team-oriented	2	5	4.13	.755	-.433	-.470
	Supportive	3	5	4.41	.648	-.636	-.589
	People-oriented	2	5	4.02	.859	-.481	-.544
	Cohesive	2	6	4.45	.757	-.696	-.492
	Structured	2	5	4.22	.734	-.449	-.748
	Formalized	1	5	3.06	.865	-.724	.509
	Predictable	1	5	2.83	1.072	.323	-.354
	Stable	1	5	4.06	.899	-.725	.184
	Risk taker	1	5	2.88	.957	.181	-.212
	Flexible	1	6	2.70	1.013	.532	.418
	Innovative	2	5	4.23	.801	-.696	-.374
	Visionary	2	5	3.52	.836	009	.070
	Competitive	3	5	4.53	.521	-.351	-.348
	Results-oriented	4	5	4.61	.488	-.475	-1.794
	Opportunistic	2	5	4.32	.722	-.732	-.130
	Goal-achiever	3	5	4.74	.925	-.428	.050
Business size	Annual turnover	1	5	3.27	.954	.091	-.557
	Number of trained employees	1	5	3.98	.865	-.411	-.428
	International reach	2	5	4.15	.850	-.646	-.436
	Number of office locations and service centres	3	5	4.43	.610	-.558	-.592
QOM	Discipline	2	5	4.19	.730	-.724	.506
	Top management commitment to improvement	2	5	3.88	.832	-.268	-.595
	Experts in management team	1	5	3.67	1.025	-.532	-.397
	Sustainability-related training	1	5	3.83	.890	-.375	-.366
	General level of education	1	5	3.94	.935	-.428	.050
Sustainable design	Eco-labelling of products	2	5	3.40	.976	.009	-1.016
	ISO 14001 certification	2	5	3.53	.960	-.039	-.932
	We use environmental management systems	2	5	3.53	.932	-.072	-.844
	Cleaner productions	2	5	3.52	.976	-.042	-.980
	Design products for recycle	2	5	3.32	.959	.045	-1.021
	Design products to avoid use of hazardous materials	2	5	3.43	.918	-.131	-.871
	Design products for reduced consumption of energy	1	5	3.31	.947	-.027	-.727
Sustainable procurement	We select suppliers based on their social and environmental skills	2	5	3.79	.662	-.620	.825
	We select suppliers based on their ability to support our social and environmental objectives	2	5	3.84	.699	-.334	.184
	We select suppliers based on their ability to create environmentally friendly products	1	5	3.86	.763	-.614	.789
	Environmental audit for supplier's internal management	2	5	3.86	.728	-.436	.244
	Providing design specification to suppliers that include environmental requirements for purchased items	2	5	3.80	.703	-.432	.331
Investment recovery	Sale of excess inventories or materials	1	5	3.60	1.122	.156	-1.046
	Sale of excess capital equipment	1	5	2.90	1.107	.325	-.788
	Sale of scraps	1	5	2.97	1.118	.211	-.755
	Sale of used materials or by-products	1	5	2.98	1.151	.156	-1.004

Sustainable distribution	Cooperation with customers for using less energy during product transportation	1	5	3.81	.825	-.703	.485
	Use of renewable energy in the process of products packaging	2	5	3.80	.781	-.437	-.009
	Use of renewable energy in any mode of products transportation	1	5	3.68	.824	-.656	.524
	Cooperation with suppliers to reduce emissions during product transportation	1	5	3.72	.781	-.407	.275
	Cooperation with suppliers to improve their waste reduction during product packaging	2	5	3.84	.702	-.409	.320
Sustainable social practices	Community investment	1	5	4.04	.795	-.571	.304
	Protecting human rights	2	5	4.03	.730	-.619	.586
	Health and safety training for employees	2	5	4.13	.678	-.369	-.044
	Sustainable working condition for employees	3	5	4.12	.705	-.022	-.972
	Employee skills development	2	5	4.05	.729	-.490	.164
Environmental performance	Reduction of wastewater	1	5	3.09	.867	.120	-.856
	Carbon footprint reduction	2	5	3.75	.839	.340	-.631
	Reduction of air pollution	1	5	3.38	.859	-.156	-.536
	Reduction of energy used	1	5	3.11	.912	-.219	-.455
	Reduction of water used	1	5	3.27	.823	-.130	-.580
	Reduction of solid waste	2	5	3.29	.779	-.045	-.609
	Decrease in use of hazardous materials	2	5	3.37	.845	.315	-.449
Economic performance	Net profit	2	5	3.84	.777	.010	-.389
	Return on sales	2	5	3.72	.688	.226	-.589
	Return on investment	2	5	3.77	.805	-.228	-.406
	Market shares	2	5	3.71	.700	-.081	-.203
	Improvement in firm's image	2	5	3.76	.747	.030	-.552
	Decrease in cost of materials purchased	2	5	3.53	.812	.004	-.479
Social performance	Improvement in employee health and safety	2	5	4.01	.694	-.204	-.334
	Improved stakeholder welfare	2	5	3.88	.724	-.148	-.356
	Improved community investment	1	5	3.85	.852	-.989	1.569
	Reduction in environmental impact to the public	1	5	3.86	.833	-.917	1.639
	Improvement in community health and safety	2	5	3.93	.748	-.713	.743
Operational performance	Proactivity	2	5	3.61	.867	-.171	-.605
	Innovation	1	5	3.64	.939	-.514	.195
	Flexibility	2	5	3.63	.882	-.125	-.684
	Speed	1	5	3.70	.880	-.357	-.077
	Low cost	1	5	3.61	.919	-.506	-.060
	Quality	2	5	3.83	.840	-.427	-.292

5.4.5 Demographic characteristics of respondents

Descriptive statistics were used in assessing the demographic distribution and socioeconomic features of the respondent firms. Table 5.6 reports the demographics, comprising company size, respondents' designation, turnover per annum, as well as the business sectors of the responding firms. Drawing from table 5.6, it is evident that the survey is representative with regard to size and respondents' designation. In addition, the different business sectors of the responding firms

support the view that, the O&G industry supply chain is served by companies from various industrial sectors. This further highlights the importance of implementing SSCM practices within the supply chain so that negative environmental impacts can be minimised significantly.

Table 5. 6: Demographic characteristics of respondents

Criteria	Percentage (%)
Designation of respondents	
CEO, MD, Director	33.2
Supply chain manager	49.1
Procurement manager	9.4
Others	8.3
Number of employees	
Up to 100	16.7
101 – 200	18.8
201 – 300	21.4
301 – 500	19.8
501 – 1000	10.4
1001 – 2000	7.3
2001 – 5000	3.1
Above 5001	2.6
Company annual turnover (£M)	
Up to 5 million	4.7
6 – 10 million	6.8
11 –20 million	9.4
21 – 50 million	14.6
51 – 100 million	39.1
Above 100 million	25.5
Business sectors	
Oil and gas service provider	20.3
Logistics and transport	7.3
Exploration and production	25.5
Marketing and Distribution	10.9
Refining	4.7
Consultancy	9.9
Retailing	10.4
Marine engineering and construction	7.8
Others	3.1

5.4.5.1 Designation of respondents

Table 5.6 reports the distribution of the respondents' designation. The major problem of organisational-level survey is that the target respondents (top management personnel) barely reply to the invitation to partake because of their very tight schedules. Nonetheless, among the participants, high-ranking personnel including CEO, MD, and Directors constitute 33.2% of the

participants. Supply chain managers form the majority, with 49.1% of the participants. Procurement managers and other positions constitute 9.4% and 8.3% of the respondents respectively. In this research, the main targeted participants were the supply chain directors or managers. This is because the information sought-after in this study is believed to be held by the supply chain managers, as they have greater knowledge on the SSCM aspects that the current research seeks to address.

5.4.5.2 Size of company

The number of personnel in the company and annual turnover reported by the respondent firms signifies the size of organisation. Table 5.6 shows that from the sample, 21.4% of the companies have between 201 – 300 staffs, whereas 19.8% of the companies have between 301 – 500 personnel. 10.4% have 500 employees and above. Therefore, the range of the organisations that responded to the survey includes both big corporations and SMEs. However, the majority of the responding firms are SMEs or companies with a number of workforces less than 500. This is consistent with a previous study of the O&G industry by Cumbers et al. (2003), in which they observed that the majority (75%) of participants in the study were SMEs.

Additionally, table 5.6 reports annual turnover as another indication of organisational size. The table indicates that there are six classifications of annual turnover of the firms that responded to the survey. The biggest category of the companies (39.1%) reported annual turnover of between 51 - 100 million pounds, which is followed by 25.5% of corporations with a turnover above 100 million pounds, indicating that large companies also participated in the survey. Nevertheless, the firm size in terms of annual turnover and number of personnel, as presented in table 5.6, implies that a substantial percentage of the responding firms are SMEs.

5.4.5.3 Business sectors of respondents

Table 5.6 provides a concise summary of the main business sectors or operational scope of the respondent firms. Notably, the key characteristic of the survey sample is that companies involved in exploration and production activities recorded the highest percentage in terms of representation (25.5%), closely followed by O&G service providers at about 20.3%. Additionally, companies involved with marketing and distribution, and retailing constitute about 10.9% and 10.4% respectively. There are also a number of companies that are involved in operations categorised under the sectors of business stated in the table hence, highlighting the broadness and sub-

contracted nature of the petroleum industry. Although the industry is arguably comprised of business entities from various industrial settings, they are linked together by a common goal of satisfying the global demand for energy. This support the view that the industry is truly an international industry, cutting across different geographical locations and transnational boundaries (Bower and Young, 1995; Keogh et al., 1998).

5.5 Inferential Statistics

In order to enhance our understanding on the influence of organisational factors (culture, size and QOM) on the implementation of SSCM practices and firm performance, correlation analysis was carried out to assess the relationships among the factors examined. Furthermore, regression analysis was performed to determine causal effects on the links between the independent and dependent variables. Correlation and regression share some similarities however, they serve distinct purposes. While correlation assesses the strength of associations among variables, regression establishes the type of the association which correlation established through estimation and prediction of the value of a dependent variable based upon the values of some independent variables. In addition, SEM analysis was carried out to assess the extent to which organisational factors affect the performance outcomes of SSCM. SEM was also employed to conduct path analysis of the research framework illustrated in Chapter 3 of this thesis. Thus, this section reports the findings obtained from the correlation analysis, regression analysis, and SEM in a sequential order.

5.5.1 Correlation analysis

Correlation coefficient is a statistical technique that measures the degree to which two variables are related. The correlation coefficient symbolised by the letter '***r***' ranges from -1 to +1 with the value indicating the strength of the association, whereas the sign (- or +) shows the direction of the relationship. Accordingly, a correlation coefficient value close to -1 or +1 indicates strong negative or positive relationship respectively (Cohen and Cohen, 2003). However, correlation cannot be used to manipulate the variables of a study to check for casual examination of association among the variables. Although the presence of correlation may not explain or signify causality, it indicates a necessary prerequisite for it. Therefore, a correlation absence shows that there is no causality among variables, disqualifying any further attempts to perform regression analysis.

5.5.1.1 Correlation analysis of the main research constructs

In order to assess the relationships between the main constructs of the study, companies' individual scores on corporate culture, business size, QOM, SSCM practices and firm performance measures were aggregated and tested for correlation. The result of the correlation analysis is shown in table 5.7. This study followed the guideline provided by (Cohen, 1988), which argued that a correlation effect size of less than 0.10 is considered weak, 0.10 to 0.30 is moderate and greater than 0.30 is strong. It is apparent from the correlation coefficients in table 5.7 that the relationships between aggregate organisational culture and SSCM practices 0.536 ($p < 0.01$), aggregate QOM and SSCM practices 0.422 ($p < 0.01$) are strong and statistically significant. However, there is only a moderate association between the size of company and the implementation of SSCM practices, as revealed by the correlation coefficient 0.151 ($p < 0.05$).

Furthermore, the relationships of organisational culture, QOM, and SSCM practices with firm performance are 0.402 ($p < 0.01$), 0.358 ($p < 0.01$), and 0.472 ($p < 0.01$) respectively. These correlation coefficients indicate that aggregate organisational culture, QOM, and SSCM practices have significant positive effects on the performance of O&G companies. Although the result from the correlation analysis shows that the main constructs of the study are related, the nature and form of interaction between the variables cannot be explained by correlation coefficients. Thus, further statistical analysis will be conducted to ascertain cause and effects of the relationships between the research variables.

Table 5. 7: Correlations between main constructs of the study

	Organisational culture	Business size	QOM	SSCM practices	Organisational performance
Organisational culture	1				
Business size	-.009 (ns)	1			
QOM	.618** (.000)	ns	1		
SSCM practices	.536** (.000)	.151* (.036)	.422** (.000)	1	
Organisational performance	.402** (.000)	ns	.358** (.000)	.472** (.000)	1

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

Table 5.8 shows the correlations between organizational factors (corporate culture, business size and QOM) and five SSCM dimensions including sustainable design, sustainable procurement, investment recovery, sustainable distribution and social practices. Some scholars have argued that companies' SSCM strategy could be determined by internal factors related to companies' capabilities and limitations (Wan Ahmad et al., 2016; Hong et al., 2022). From table 5.8, it is apparent that the highest level of correlation was recorded between organisational culture and sustainable procurement 0.443 ($p < 0.01$). This is followed by organisational culture and sustainable distribution 0.364 ($p < 0.01$). Another strong correlation was recorded between QOM and sustainable distribution 0.273 ($p < 0.01$). Even though the results in table 5.8 show that there is a significant positive relationship between firms' internal factors and SSCM practices, the correlation of business size with sustainable procurement and investment recovery is not statistically significant. A more detailed account of the relationships between firms' internal factors and the five dimensions of SSCM practices are presented in table 5.8.

Table 5. 8: Correlations between organisational factors and SSCM practices

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Organisational culture	.250** (.000)	.443** (.000)	ns	.364** (.000)	.265** (.000)
Business size	.119* (.003)	ns	ns	.289** (.004)	.214** (.003)
QOM	.291** (.000)	.284** (.000)	.198** (.006)	.273** (.000)	.151* (.036)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**					

5.5.1.2 Correlations analysis of organisational culture attributes and SSCM practices

In order to test hypothesis 1, correlation analysis of the organizational culture attributes and SSCM practices was conducted. Extant literature has pointed out that organisational culture plays a crucial role in the implementation of SSCM practices (Seuring and Müller, 2008; Walker and Jones, 2012; Hong et al., 2022). Nevertheless, few previous studies have attempted to assess the relationships between organisational culture attributes and SSCM practices. Thus, there is a lack of clarity in terms of the characteristics of culture that firms must nurture in order to implement sustainable practices effectively. This study therefore assesses the relationships between organisational culture

attributes and SSCM practices, with the aim of determining the characteristics of culture that support the sustainability drive of organizations. In doing so, a bivariate correlation analysis was carried out.

The result of the analysis in table 5.9 indicates that some of the organizational culture attributes have significant positive correlations with SSCM practices, while others were found to be insignificant. “Innovation” displayed a significant positive correlation with all the SSCM practices, with the strongest correlation on “sustainable design” 0.442 ($p < 0.01$), followed by “sustainable procurement” at 0.313 ($p < 0.01$). The next attribute with remarkable correlations after innovation, is risk-taking. From table 5.9, it can be seen that “risk-taking” also recorded strong correlations with all the SSCM practices, with the highest correlation on “investment recovery” at 0.312 ($p < 0.01$). The results in table 5.9 show that there is a significant correlation between “people orientation” and “social sustainability practices” 0.250 ($p < 0.01$), which means that the higher the people orientation in an organisation, the greater the implementation of social sustainability practices. Similarly, stability in organizations was found to have the highest correlation with sustainable distribution 0.271 ($p < 0.01$). This seems to indicate that the ability of organisations to maintain long-term stability may lead to the development of sustainable distribution initiatives.

Table 5. 9: Correlations between organisational culture attributes and SSCM practices

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Team-oriented	ns	.279** (.000)	ns	.279** (.000)	.195** (.007)
Supportive	.236** (.000)	ns	.192** (.000)	.137* (.009)	.131* (.002)
People-oriented	.147* (.042)	.227** (.000)	ns	ns	.250** (.000)
Cohesive	ns	ns	ns	277* (.000)	.155* (.000)
Innovative	.442** (.009)	.313** (.006)	.155* (.000)	.242** (.001)	.236** (.001)
Visionary	128* (.002)	.173* (.015)	.213** (.001)	ns	ns
Flexible	.182* (.002)	ns	ns	ns	ns
Risk taker	.296** (.000)	.292** (.000)	.312* (.003)	.248* (.006)	.178* (.004)
Structured	ns	ns	ns	.204** (.005)	.157* (.030)

Stable	.121* (.003)	ns	.124** (.000)	.271** (.000)	.219** (.000)
Formalized	ns	242* (.000)	263** (.001)	ns	144** (.001)
Predictable	ns	ns	.128* (.000)	ns	ns
Results-oriented	.311** (.000)	.128* (.015)	.149* (.008)	ns	.197* (.005)
Competitive	.134* (.004)	.151* (.002)	ns	.188* (.009)	.135* (.000)
Goal-achiever	.167* (.020)	.155* (.000)	ns	ns	.198* (.000)
Opportunistic	ns	ns	.173* (.016)	ns	.213** (.001)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**					

From table 5.9, it is evident that a strong organizational culture, which is widely shared among organizational members, is positively related to the implementation of SSCM practices. Therefore, in order to achieve greater sustainability performance, managers must strive towards building a strong sustainability-oriented organizational culture. For example, organizations could pursue characteristics of the culture that enable innovation and risk-taking, as well as aim at increasing long-term value through proactive SSCM practices, rather than focusing on mere environmental compliance strategies. Details of the relationships between organizational culture attributes and SSCM practices are shown on table 5.9, as discussing all will be superfluous.

5.5.1.3 Correlations analysis of business size and SSCM practices

Correlation analysis was used to examine the relationships between a firm's size and its implementation of SSCM practices. This proposition is based on the idea that the size of an organization could either facilitate or hamper the development of SSCM initiatives in a supply chain. In order to test hypothesis 2, a bivariate correlation analysis was conducted between the four measures of organisational size (annual turnover, number of employees, international reach and number of office locations) and the five dimensions of SSCM. As shown on table 5.10, both significant and insignificant correlations were recorded.

Table 5. 10: Correlations between business size and SSCM practices

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Annual turnover	.257** (.001)	.125* (.004)	ns	ns	.180* (.013)
Number of trained staff	.189* (.000)	ns	.154* (.005)	.122* (.000)	.215** (.003)
International reach	.216** (.000)	.192* (.000)	ns	.195* (.015)	219** (.002)
Number of office locations	ns	ns	.226** (.000)	ns	.198** (.006)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**					

From table 5.10, it is apparent that the strongest variable that influences firms' implementation of SSCM practices is annual turnover, recording 0.257 ($p < 0.01$) correlation with sustainable design. This indicate that the higher the annual turnover, the greater the ability of companies to design and create new sustainable products that have the least negative social and environmental impacts. International reach also displayed strong correlations with social practices and sustainable design at 0.219 ($p < 0.01$) and 0.216 ($p < 0.01$) respectively, which implies that multinational companies have a higher inclination to implement sustainable practices as they are subjected to different environmental regulations. In the same vein, number of trained employees also has significant positive correlations with sustainable design, investment recovery, sustainable distribution, and social sustainability practices.

5.5.1.4 Correlations analysis of QOM attributes and SSCM practices

Numerous studies have argued that top management support and commitment are crucial to the adoption of SSCM practices (Walker and Jones, 2012; Harms et al., 2013; Zhu et al., 2013). However, what is missing in extant literature is a study on the link between QOM and the implementation of SSCM practices. To date, the concept of QOM itself has not been clearly defined in existing literature. In light of the dearth of research on the connection between QOM and SSCM practices, the current study proposed hypothesis 3 to fill the gap in knowledge. In order to test this hypothesis, a bivariate correlation analysis between the attributes of QOM and SSCM practices was conducted. Table 5.11 shows the result of the correlation analysis between five QOM attributes and the main dimensions of SSCM.

Table 5. 11: Correlations between QOM attributes and SSCM practices

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Discipline	.173* (.016)	.259** (.000)	ns	ns	ns
Top management commitment to improvement	.246** (.001)	.211** (.003)	.206** (.004)	.171* (.018)	.117* (.006)
Experts in management team	.226** (.004)	.228** (.002)	ns	.207** (.001)	.149* (.039)
Sustainability-related training	.219** (.002)	.274** (.000)	.169* (.019)	.188** (.009)	.171* (.017)
General level of education	.300** (.000)	.321** (.000)	.206** (.004)	.341** (.000)	ns

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

As shown on table 5.11, top management commitment to improvement and sustainability-related training recorded significant positive correlation with all the dimensions of SSCM. This mean that, in the surveyed organisations, SSCM strategies are enforced by the top management who also ensure the success of such initiatives through providing effective sustainability-related training across different hierarchies of the organisation. Interestingly, the results in table 5.11 show that the strongest correlation was recorded between general level of education and sustainable distribution 0.341 ($p < 0.01$), indicating that the higher the knowledge accumulation in an organisation, the greater likelihood that sustainable distribution capabilities may develop. Similarly, experts in management team recorded the highest significant positive correlation with sustainable procurement 0.228 ($p < 0.01$), followed by sustainable design 0.226 ($p < 0.01$). Even though discipline was found to have positive correlations with sustainable design and sustainable procurement at 0.173 ($p < 0.05$) and 0.259 ($p < 0.01$) respectively, it displayed negative correlations with investment recovery, sustainable distribution and social sustainability practices.

5.5.1.5 Correlations analysis of organisational culture and performance outcomes

In a dynamic business environment characterized by intense competition, it is extremely essential for companies seeking to maximise their performance to understand the influence of organisational culture on business processes. Researchers have maintained that the performance of a company is determined by the extent to which their cultural values are strong, that is, commonly shared (Deal and Kennedy, 1982; Heskett and Kotter, 1992). In testing this hypothesis, correlation analysis was

conducted between organisational culture attributes and performance outcomes. In doing so, two types of correlations were performed. The first correlation is that of the aggregate constructs shown in table 5.12, and the second correlation is the assessment of the relationship between individual variables of organisational culture and the performance outcomes, which is reported in table 5.13.

Table 5.12 shows that aggregate organisational culture is positively related to all the performance outcomes, with the strongest correlation coefficient on social performance 0.481 ($p < 0.01$). Similarly, it can be seen from table 5.12 that organisational culture also recorded significant correlations with economic performance, environmental performance, and operational performance at 0.293 ($p < 0.01$), 0.168 ($p < 0.05$) and 0.243 ($p < 0.01$) respectively.

Table 5. 12: Correlations between aggregate organisational culture and performance outcomes

	Economic performance	Environmental performance	Social performance	Operational performance
Organisational culture	.293** (.000)	.168* (.003)	.481** (.000)	.243** (.001)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**				

Although the results in table 5.12 show that organisational culture correlates positively with firm performance, there is a need-to-know what characteristics of culture are responsible for the correlation. In doing so, a bivariate correlation analysis between organisational culture attributes and performance outcomes was conducted and the results are presented in table 5.13.

Table 5. 13: Correlations between organisational culture attributes and performance outcomes

	Economic performance	Environmental performance	Social performance	Operational performance
Team-oriented	.295* (.000)	ns	.192* (.003)	ns
Supportive	ns	.238** (.000)	.290** (.000)	ns
People-oriented	ns	ns	.204** (.005)	.170* (.018)
Cohesive	ns	ns	.292* (.000)	196* (.004)
Innovative	.114*	.165*	.259**	ns

	(.004)	(.000)	(.000)	
Flexible	.147* (.000)	.271* (.001)	ns	.194* (.004)
Visionary	.177* (.002)	.233* (.000)	ns	133* (.000)
Risk taker	.181* (.002)	ns	ns	ns
Structured	ns	.126* (.005)	.274** (.000)	.133* (.000)
Formalized	154* (.004)	.248** (.005)	122* (.006)	ns
Stable	.147* (.002)	ns	.333** (.000)	.168* (.005)
Predictable	ns	ns	ns	ns
Results-oriented	.412** (.000)	.244** (.000)	ns	.122* (.006)
Competitive	.269** (.000)	.157* (.030)	.248** (.005)	.177* (.014)
Goal-achiever	.192* (.003)	299* (.000)	ns	.142* (.006)
Opportunistic	ns	ns	ns	ns
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**				

It is apparent from table 5.13 that "results-oriented culture" has the highest correlation at 0.412 ($p < 0.01$) to "economic performance". "Stable culture" recorded a statistically significant relationship with "social performance", with a correlation coefficient of 0.333 ($p < 0.01$). More so, "supportive culture" was also found to have a strong correlation with "social performance" at 0.290 ($p < 0.01$). Notably, the most important findings from the correlation analysis indicate that "competitive culture" has a significant positive correlation with all the performance outcomes, recording a correlation coefficient of 0.269 ($p < 0.01$) to "economic performance", which is the strongest relationship as displayed in table 5.13. Similarly, the results also reveal that there is significantly positive relationship between "team-oriented culture" and "economic performance", with a correlation coefficient of 0.295 ($p < 0.05$). However, "predictable" and "opportunistic" cultures are not significantly correlated to any of the performance outcomes. This finding seem to indicate that the performance benefits of a strong culture result from three implications of having strongly held and commonly shared values and norms: better control and coordination in the organisation, emphasis on common organisational objectives by personnel and shareholders, and improved workforce motivation, as argued by (Burt et al., 1994; Lee and Yu, 2004).

5.5.1.6 Correlations analysis of QOM attributes and performance outcomes

Even though a number of previous studies (Ghoshal and Bartlett, 1994; Coggburn and Schneider, 2003) have argued that QOM is a necessary antecedent to performance, there is a lack of empirical research on the link between QOM and firm performance. Hence, the current study seeks to assess the degree to which the QOM in an organisation affect its performance. In testing this hypothesis, correlation analysis was performed between QOM attributes and performance outcomes. In doing so, two types of correlations were conducted. The first correlation examines the relationships of the aggregate constructs, which is reported in table 5.14. The second correlation assesses the association between the individual variables of QOM and the performance outcomes, which is shown in table 5.15.

From table 5.14, it is apparent that aggregate "QOM" recorded a significant positive correlation with all the performance outcomes, with the strongest correlation coefficient on "economic performance" 0.255 ($p < 0.01$), followed by "operational performance" at 0.252 ($p < 0.01$) and "social performance" at 0.243 ($p < 0.01$). Nevertheless, it is surprising that the lowest correlation coefficient was recorded between QOM and environmental performance at 0.180 ($p < 0.05$). This therefore suggest that, in the surveyed organisations, other variables such as SSCM practices account for improvements in environmental performance. The results in table 5.14 are supported by (Mcguire et al., 1990) who argued that management actions might have an impact on firm performance. This assertion is based on the assumption that performance is the ultimate management responsibility.

Table 5. 14: Correlations between aggregate QOM and performance outcomes

	Economic performance	Environmental performance	Social performance	Operational performance
Quality of management	.255** (.000)	.180* (.013)	.243** (.001)	.252** (.000)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**				

Table 5.15 reports the correlation result between QOM attributes and business performance. It is evident from the table that out of the five QOM attributes, only three recorded significant correlations with all the performance outcomes. The attributes that displayed positive associations with all the performance outcomes are top management commitment to improvement, sustainability-related training, and general level of education. Similarly, experts in management

team also displayed significant relationships with the performance outcomes except environmental performance, which is not statistically significant. On the other hand, discipline correlates with only operational performance.

The results from the analysis presented in table 5. 15 suggests that "experts in management team" has the highest correlation at 0.244 ($p < 0.01$) to "social performance". More so, "sustainability-related training" also recorded a strong correlation with "social performance" at 0.238 ($p < 0.01$). The next attribute that displayed a strong relationship is "general level of education", which recorded a correlation coefficient of 0.230 ($p < 0.01$) to "economic performance". Furthermore, it is apparent from table 5.15 that the QOM attribute that is highly related to operational performance is "top management commitment to improvement" at 0.228 ($p < 0.01$).

Table 5. 15: Correlations between QOM attributes and performance outcomes

	Economic performance	Environmental performance	Social performance	Operational performance
Discipline	ns	ns	ns	.201** (.005)
Top management commitment towards improvement	.201** (.005)	.132* (.000)	.156* (.031)	.228** (.001)
Experts in management team	.206** (.004)	ns	.244** (.001)	.163* (.024)
Sustainability-related training	.222** (.002)	.174* (.016)	.238** (.001)	.194** (.007)
General level of education	.230** (.001)	.201** (.005)	.221** (.002)	.222** (.002)

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

The correlation assessment reported in table 5.15 shows the seeming effect of attributes of QOM on the performance outcomes in general. In particular, it further confirms that QOM attributes have significantly positive impact on the performance of the surveyed organisations. The finding of positive relationships between QOM and firm performance implies that, organisations with more management capacity will typically have the ability to perform better than organisations with less management capacity. As pointed out by (Ghoshal and Bartlett, 1994), the degree to which an organisational context is positively shaped has a significant consequence on business performance

and thus, it is a key duty of managers to ensure that their organisations are effectively shaped in order to achieve organisational goals.

5.5.1.7 Correlations analysis of SSCM practices and performance outcomes

Several studies on the relationship between SSCM practices and performance outcomes have been conducted in different contexts with mixed findings. While some studies found positive impacts (Yusuf et al., 2013; Paulraj et al., 2017), others identified opposite results (Mahoney and Roberts, 2007; Parast and Adams, 2012). Consequently, uncertainty remains in terms of the performance implications of implementing SSCM practices. This study therefore attempts to enhance our understanding on whether the adoption of SSCM practices will eventually contribute to the performance of firms. In testing this hypothesis, correlation analysis was performed between SSCM practices and performance outcomes. Two types of correlations were conducted. The first correlation was that of the aggregate constructs, which is reported in table 5.16. The second correlation assesses the relationships between the individual variables used to measure the research constructs, which are reported in tables 5.17 – 5.21.

From table 5.16, it can be seen that there is a statistically significant relationship between aggregate SSCM practices and the four performance outcomes, with the strongest correlation coefficient on "operational performance" 0.364 ($p < 0.01$). This result is supported by (Yusuf et al., 2013), who observed improvements in operational performance due to the implementation of SSCM practices in supply chains. However, the most noteworthy finding from the correlation analysis indicates that aggregate SSCM practices have a statistically significant association with "economic performance", recording a correlation coefficient of 0.321 ($p < 0.01$). This finding offers some clarity to the ambiguity concerning the impacts of SSCM on performance, such as the increasing debate on 'whether it pays to be sustainable/green', and further attests that the adoption of proactive SSCM practices will eventually result in improved profitability and economic performance of firms.

Table 5. 16: Correlations between aggregate SSCM practices and performance outcomes

	Economic performance	Environmental performance	Social performance	Operational performance
SSCM practices	.321** (.000)	.299** (.000)	.211** (.003)	.364** (.000)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**				

In addition, table 5.16 shows that aggregate SSCM correlates positively with "environmental performance", recording a correlation coefficient of 0.299 ($p < 0.01$). Generally, the position of the literature on the relationship between SSCM adoption and environmental performance is very clear. Many empirical and non-empirical studies (Esfahbodi et al., 2016; Paulraj et al., 2017; Seuring and Müller, 2008) have shown that the implementation of SSCM practices within the supply chain will enhance the environmental performance of companies. In the same vein, aggregate SSCM also correlates positively to "social performance" at 0.211 ($p < 0.01$). This seem to indicate that investments in SSCM initiatives are not necessarily associated with economic benefits. Other intangible aspects such as customer satisfaction, employee job satisfaction, employee engagement, and community developments are relevant to organizations but are more difficult to quantify in terms of monetary value (Savitz and Weber, 2014).

Table 5. 17: Correlations between SSCM dimensions and performance outcomes

	Economic performance	Environmental performance	Social performance	Operational performance
Sustainable design	.295** (.000)	.216** (.003)	ns	.294** (.000)
Sustainable procurement	.270** (.000)	.182* (.011)	.197** (.006)	.196** (.006)
Investment recovery	.223** (.005)	.342** (.000)	ns	.406** (.000)
Sustainable distribution	ns	.281** (.000)	.166* (.022)	.238** (.001)
Social practices	.231** (.001)	ns	.191** (.008)	.228** (.002)

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

Table 5.17 reports the result of the correlation analysis between the five dimensions of SSCM and the four performance outcomes. As shown in the table, only "sustainable procurement" has a significant positive relationship with all the performance outcomes. On the other hand, the correlations of "sustainable design" and "investment recovery" with "social performance" are not statistically significant. The relationship between "sustainable distribution" and "economic performance" is also not statistically significant. Similarly, there is no correlation between "social sustainability practices" and "environmental performance" as indicated by the result in table 5.17. This is quite surprising because one would expect social sustainability practices to be positively

associated with environmental performance. But, considering that "social sustainability practices" recorded a significant correlation with "social performance" at 0.191 ($p < 0.01$), one can argue that perhaps the social sustainability practices being implemented by the surveyed organisations are aimed at improving their social performance, as other practices such as sustainable design and sustainable distribution have accounted for improvements in the environmental performance of the respondents.

Table 5. 18: Correlations between SSCM dimensions and economic performance measures

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Net profit	.286** (.001)	.198** (.003)	.256** (.000)	ns	ns
Return on sales	.281** (.000)	.224** (.002)	ns	ns	.186** (.010)
Return on investment	.249** (.000)	ns	.271** (.000)	ns	.160* (.015)
Market shares	.223** (.002)	.199** (.006)	.144* (.009)	ns	ns
Decrease in cost of materials purchased	.350** (.000)	.268** (.000)	ns	ns	.218** (.002)
Improvement in firm's image	.231** (.001)	.263** (.000)	ns	.177* (.014)	.287** (.000)

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

Table 5.18 shows the correlations between SSCM practices and economic performance measures. From the table, it is evident that the highest correlation coefficient was recorded between "sustainable design" and "decrease in cost of materials purchased" at 0.350 ($p < 0.01$), which seems to be an interesting contribution to the SSCM literature as previous studies have paid little attention towards assessing such relationships. "Social sustainability practices" also recorded a strong correlation with "improvement in firms' image" at 0.287 ($p < 0.01$), which is in line with the results of earlier studies (Gimenez et al., 2012; Savitz and Weber, 2014) that social sustainability practices are related to improvements in firms' reputation. Another variable that displayed a strong correlation coefficient is "sustainable design" at 0.281 ($p < 0.01$) to return on sales. This is followed by the correlation between "investment recovery" and "return on investment" at 0.271 ($p < 0.01$).

On the other hand, insignificant relationships were also recorded in the correlation analysis, as shown in table 5.18. For example, the correlation coefficients of "sustainable distribution" and "social practices" with "net profit" are not statistically significant. In support of this finding, some researchers have argued that setting up SSCM initiatives, such as environmentally friendly policies and community development can result in additional costs (McWilliams and Siegel, 2011). However, the numerous benefits derivable from SSCM adoption outweighs the costs of implementing such initiatives. A number of empirical studies have shown that proactive SSCM practices will translate into profitability in the long-term and not within the short-term (Wagner, 2015; Paulraj et al., 2017).

Table 5. 19: Correlations of SSCM dimensions and environmental performance measures

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Reduction of wastewater	.235** (.001)	.164* (.023)	.206** (.004)	256** (.000)	ns
Carbon footprint reduction	.234** (.000)	.116* (.004)	ns	.137* (.017)	.244** (.001)
Reduction of air pollution	.123* (.011)	.211** (.003)	.270** (.000)	.210** (.003)	ns
Reduction of energy used	.182* (.009)	ns	ns	.120* (.016)	ns
Reduction of water used	.267** (.000)	.270** (.000)	.416** (.000)	.324** (.000)	.176* (.015)
Reduction of solid waste	.217** (.002)	.172* (.017)	.355** (.000)	.226** (.002)	.154* (.005)
Decrease in use of hazardous materials	.287** (.000)	.183* (.011)	.283** (.000)	.367** (.000)	.260** (.001)

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

Table 5.19 reports the correlations between SSCM practices and environmental performance measures. It is apparent from the table that out of the seven environmental performance measures, only three recorded significant positive relationships with all the dimensions of SSCM. They include "reduction of water used", "reduction of solid waste" and "reduction in use of hazardous materials". As shown in table 5.19, the strongest correlation coefficient was recorded between "investment recovery" and "reduction of water used" at 0.416 ($p < 0.01$), followed by "sustainable

distribution" to "decrease in use of hazardous materials" at 0.367 ($p < 0.01$), and "investment recovery" to "reduction of solid waste" at 0.355 ($p < 0.01$). In contrast to the significant correlations, few other relationships were found to be insignificant. For instance, social sustainability practices are not associated with "reduction of wastewater", investment recovery is not related to "carbon footprint reduction", and only sustainable procurement and sustainable distribution are associated with "reduction of energy used". Nonetheless, majority of the variables in table 5.19 recorded some form of correlations with one another. Generally, there is statistically significant relationships between sustainable practices and environmental performance in the O&G industry, which is consistent with a number of previous studies (Zhu et al., 2007; Yusuf et al., 2013; Luthra et al., 2016).

Table 5. 20: Correlations between SSCM dimensions and social performance measures

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Improved employee health and safety	.199** (.000)	.182* (.007)	ns	.153* (.034)	.185* (.010)
Improved stakeholder welfare	ns	.301** (.000)	ns	.223** (.002)	.192** (.008)
Improved community investment	ns	.196** (.006)	ns	.178* (.013)	.166* (.021)
Reduction in environmental impact to the public	.132* (.004)	.263** (.000)	ns	.144* (.020)	.280** (.001)
Improved community health and safety	.125* (.000)	.142* (.049)	.184* (.008)	.273** (.000)	.153* (.034)

****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**

Table 5.20 reports the correlations of SSCM practices and social performance measures. From the table, it can be seen that three SSCM dimensions including sustainable procurement, sustainable distribution and social sustainability practices recorded significant positive relationships with all the social performance measures. The highest correlation score was recorded between "sustainable procurement" and "improved stakeholder welfare" at 0.301 ($p < 0.01$). This is followed by the correlation of "social practices" to "reduction in environmental impact to the public" at 0.280 ($p < 0.01$). However, the correlations of investment recovery to four of the social performance measures

are insignificant. “Investment recovery” is related to only “improved community health and safety” as suggested by the results in table 5.20. Similarly, the correlations of sustainable design to two of the social performance measures are also insignificant. “Sustainable design” is related to “improved employee health and safety”, “reduction in environmental impact to the public”, and “improved community health and safety”.

Table 5. 21: Correlations between SSCM dimensions and operational performance measures

	Sustainable design	Sustainable procurement	Investment recovery	Sustainable distribution	Social practices
Proactivity	.287** (.000)	ns	.394** (.000)	.252** (.002)	.197** (.006)
Innovation	.308** (.000)	.312** (.000)	.347** (.000)	.340** (.000)	.235** (.001)
Flexibility	.227** (.002)	ns	.340** (.000)	ns	.165* (.022)
Speed	.216** (.003)	ns	ns	.409** (.000)	.275** (.000)
Low cost	.116* (.030)	.149* (.039)	.166* (.021)	.270** (.005)	ns
Quality	.280** (.000)	.187** (.009)	.327** (.000)	ns	.237** (.001)
****. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).**					

Table 5.21 reports the correlations of SSCM practices and operational performance measures. It is apparent from the table that there are significant positive relationships between the five dimensions of SSCM and “innovation”. The strongest correlation coefficient was recorded between “sustainable distribution” and “speed” at 0.409 ($p < 0.01$). “Investment recovery” recorded a correlation coefficient of 0.394 ($p < 0.01$) to “proactivity”. “Sustainable design” is associated with “quality” of products or services, recording a correlation coefficient of 0.280 ($p < 0.01$). “Sustainable procurement” is related to “low costs”, recording a correlation coefficient of 0.149 ($p < 0.05$). “Social sustainability practices” recorded a significant relationship with “flexibility” at 0.165 ($p < 0.05$). Nevertheless, the relationship between social sustainability practices and low cost is not significant. This further confirms the findings in table 5.18, which suggests that there is

no relationship between SSCM practices and net profit. The general position of the literature is that the implementation of sustainable practices can result in additional costs (McWilliams and Siegel, 2011; Ameer and Othman, 2012). Thus, it is not surprising that "social sustainability practices" are not associated with "low costs" as indicated by the correlation results in table 5.21. Likewise, sustainable procurement and sustainable distribution are not associated with flexibility, and investment recovery is not related to speed.

5.5.2 Regression analysis

Regression analysis enables researchers to establish causal effects on the relationships between a set of independent variables and one dependent variable. A regression analysis can either be a multiple regression or linear regression depending on the number of variables. Multiple regression is conducted when there is two or more independent variable that explains the variance in one dependent variable. On the other hand, simple linear regression analysis is carried out when there is a single independent variable affecting a dependent variable (Sekaran and Bougie, 2016).

Regression analysis is aimed at testing the causal effects of independent variables on a single dependent variable. Primarily, regression analysis is employed in measuring the relationship between a set of independent variables and a dependent variable, as well as in assessing whether the relationship between the variables is significant or not (Bryman, 2012; Easterby-Smith et al., 2015). The goal of regression analysis is to get an effective formula for predicting the values of a dependent variable for a number of independent variables.

Nevertheless, a key distinguishing feature between correlation analysis and regression analysis is that the former assesses only the association between the two variables, which can either be positive or negative, and does not assume that an independent variable influences the dependent variable. On the other hand, regression analysis examines the way in which the values of a dependent variable changes once any of the independent variables is varied, whereas the remaining independent variables are constantly upheld (Bryman and Bell, 2011). It is a very popular and commonly used technique for data analysis in social science.

This study uses **SPSS version 23** to perform a multiple regression analysis to establish the impacts of three independent variables (organisational culture, QOM and SSCM practices) on business performance, which is our dependent variable in this study. Regression analysis was carried out

after all the research variables were correlated with one another (Saunders and Thornhill, 2003). Regression analysis model uses this 'line of fit' to predict the value of dependent variable from the assigned values of an independent variables. Hence, this line is considered to be the regression line. The equation below shows how the regression line can be explained:

Y = a + bX

Where:

- a is the intercept. This signifies the value of Y at the point where the regression line crosses the Y axis. It is referred as the regression constant.
- b is the slope. It signifies the number of units by which Y changes for each change in a unit of X. This is regarded as the regression coefficient. Y is generally referred to as dependent variable, whilst X is the independent variable.
- Additionally, if b = 1, then the line is at 45 degrees. If b > 1 then the slope is steeper, and if b<1, then it is less than 45 degrees. More so if b = 0, it indicates the changes in X have no effect on the values of Y. Therefore, if b is positive, it follows that Y increases as X increases (the line rises from left to right), and if it is negative, it follows that Y decrease as X increases (the line falls from left to right) (Saunders et al.,2009).

Before conducting the regression analysis, some requirements must be met. In the process of multiple regression analysis, there is a rule that suggests that variables must be normally distributed, and multicollinearity should not be present amongst the variables. The test for normality undertaken earlier indicates absence of significant departure from normality by the variables. When there is a very high correlation among the variables in a model, then there is a case of multicollinearity. In this study, the correlation results of the research variables were all less than 0.7, which is considered to be normal. Therefore, multicollinearity is not an issue in the regression analysis. Fidell et al., (2006) states that multicollinearity becomes an issue if the correlation score is within the range of 0.7 to 0.9 between variables, which indicates an absence of multicollinearity in our case.

5.5.2.1 Explaining the outputs data in the regression model

In the results of regression analysis, there are three most important outputs, which include the model summary, the table of ANOVA and the table of coefficients. These outputs are contained in tables 5.22, 5.23 and 5.24 respectively. However, due to the number of statistics contained in these tables, only the key indices are discussed.

The first set of output - **Model Summary**, demonstrates four statistics that summarise the model:

- R Square is the square correlation coefficient, or the determination coefficients. It explains the degree to which X Predicts Y. Primarily, it demonstrates the percentage of variance in the dependent variable explained by the independent variables. From table 5.22, it is apparent that 16.2% of variance in business performance is explained by "organisational culture", 18.1% of variance in business performance is explained by "QOM", and 26.4% of variance in business performance is explained by "SSCM practices".
- Adjusted R Square takes into account the assumption that a given R Square of any sample to some extent often inflate the goodness of fit that is truly discovered in the population from which it has been drawn. What this implies from table 5.22 is that the R Square for model 1 is reduced from 0.162 to 0.157, the R Square for model 2 is reduced from 0.181 to 0.172, and the R Square for model 3 is reduced from 0.264 to 0.252.

Table 5. 22: Model summary

Model	R	R Square	Change Statistics				
			Adjusted R Square	F Change	df1	df2	Sig. F Change
1	.402 (a)	.162	.157	36.672	1	190	.000
2	.426 (b)	.181	.172	4.466	1	189	.036
3	.514 (c)	.264	.252	21.130	1	188	.000

a. Predictors: (Constant), Organisational culture

b. Predictors: (Constant), Organisational culture, QOM

c. Predictors: (Constant), Organisational culture, QOM, SSCM practices

d. Dependent variable: Business performance

Table 5. 23: Analysis of variance (ANOVA)

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	4898.153	1	4898.153	36.672	.000[b]
	Residual	25377.659	190	133.567		
2	Regression	5483.955	2	2741.978	20.903	.000[c]
	Residual	24791.857	189	131.174		
3	Regression	7988.875	3	2662.958	22.463	.000[d]
	Residual	22286.938	188	118.548		
	Total	30275.813	191			

a. Dependent variable: Business performance

b. Predictors: (Constant), Organisational culture

c. Predictors: (Constant), Organisational culture, QOM

d. Predictors: (Constant), Organisational culture, QOM, SSCM practices

Table 5. 24: Coefficients Beta

Model		Unstandardized coefficients		Standardized coefficients			Correlations			Collinearity statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(constant)	71.268	6.036		11.807	.000					
	Organisational culture	1.760	.291	.402	6.056	.000	.402	.402	.402	1.000	1.000
2	(constant)	68.822	6.092		11.296	.000					
	Organisational culture	1.282	.366	.293	3.502	.001	.402	.247	.230	.619	1.616
	QOM	.636	.301	.177	2.113	.036	.358	.152	.139	.619	1.616
3	(constant)	51.211	6.944		7.374	000					
	Organisational culture	.612	.377	.140	1.621	.107	402	.117	.101	.526	1.900
	QOM	.455	.289	.126	1.575	.117	.358	.114	.099	.607	1.647

	SSCM practices	.257	.056	.344	4.597	.000	.472	.318	.288	.699	1.430

a. Dependent variable: Business performance

The second part of the results is **ANOVA** (table 5.23). It contains the statistics that establish if the effect of the X on Y is significant. This is established through dividing the variance in Y which is explained in the regression model by the variance in Y that remains unexplained (e.g., the analysis of the percentage of variation that has been explained). Generally, residual refers to what is left unexplained.

- The first column of the ANOVA shows the 'Sum of Square'. This explains the distance between each observation of Y and the mean of Y, square to remove minus signs, and all added together (the total variation in Y). The Sum of Squares of the Regression (the first row) is the amount of the variance explained by the model (the variations in Y that can be likened to the association with X), whilst the Sum of Squares of the Residual (in the second row) is the amount of variance that remained unexplained. This must have been caused by other variables not in the model, or other inaccurate measurement of Y. In a more practical step, if we divide the sum of the squares of the regression by the total sum of the squares, we will get R square statistics (the proportion of the total variance in Y explained in the regression). Hence, the sum of squares of the regression in "model 1" (4898.153) divided by the total sum of the squares (30275.813) produces the R Square value of 0.162. The sum of squares of the regression in "model 2" (5483.955) divided by the total sum of the squares (30275.813) produces the R Square value of 0.181. The sum of squares of the regression in "model 3" (7988.875) divided by the total sum of the squares (30275.813) produces the R Square value of 0.264.

- The 'Mean Square' column is the average amount in which each observation of Y differs from the mean. It is determined by dividing the sum of the squares by degrees of freedom.

- The 'F test' demonstrates the statistical test of the significance. It expresses the mean square of the regression and the mean square of the residual as a ratio. From table 5.23, it can be seen that all the models are significant ($p = .000$).

The last output in table 5.24 is **Coefficients**. This provides the figure from which we can construct the equation for the regression line. From the coefficients table, the following statistical results are the most important:

- 'B' is the regression coefficients, or the slope of the line. This figure for the dependent variable shows the amount in which the Y changes for each unit increase in X. For example, for every unit

we increase the strength of culture, QOM, and SSCM practices, organisations performance is improved.

- 'Beta' is the standardised regression coefficient. In a simple regression, this is the same as Pearson's r, but in a multiple regression models involving more than one independent variable, the betas will show the relative strength of the different independent variables influencing the dependent variable.
- 't' is the t test which assesses if the relation of the independent variable to Y could have occurred by chance. The value of t is determined by dividing B by the standard error of B. In this case, the t value for SSCM practices is statistically significant ($p < 0.000$) whilst the t values for organisational culture ($p = .107$) and QOM ($p = .117$) are not significant. However, before adding SSCM practices to the regression model, they were significant as shown in table 5.24. This seem to indicate that the impacts of culture and QOM on business performance could have occurred indirectly through SSCM practices, which suggest the existence of mediation. Therefore, further statistical analysis will be conducted in the next section to assess the possible mediating effects. The 'coefficients' table provides the information that can be used to construct the mediation model/equation.

In addition, the two graph that follow indicate the histogram of the regression standardised residual for the dependent variable as well as the observed by expected cumulative probability for the dependent variable, business performance.

Histogram is a statistical chart, which is used to determine the distribution of a database. The histogram demonstrate that the scores were reasonably distributed. In any case, the assessment of other characteristics is required and necessary including the Normal Q-Q Plot, which also supported the histogram as shown below.

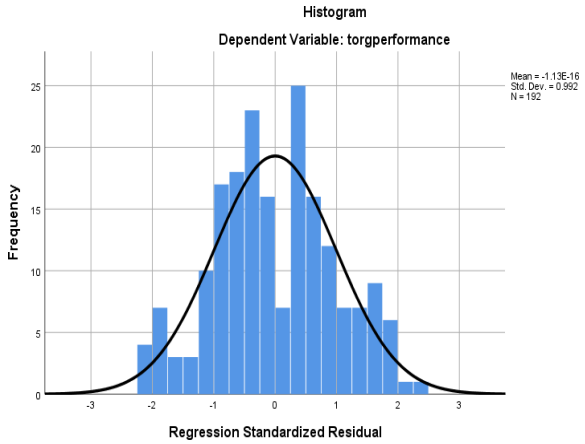

Figure 5. 3: Histogram

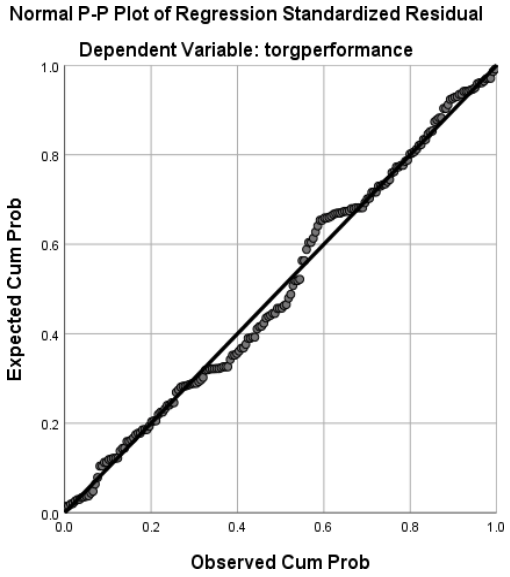

Figure 5. 4: Normal q-q plot

5.5.3 Structural Equation Modelling

Structural equation modelling (SEM) is a very general, linear and cross-sectional statistical modelling technique, which is used in analysing the structural connection between latent constructs and measured variables (Hair et al., 2010). Researchers prefer this method due to the fact that it estimates the multiple and interrelated dependence in one analysis, and it offers analyses for latent constructs (variables not observed or measured directly). SEM mainly focuses on latent constructs – abstract variables like "culture" – instead of the manifest variables used to measure the latent constructs (Hair et al., 2010).

In order to examine the mediating effects of SSCM practices on the relationship between organisational factors (culture and QOM) and firm performance, SEM analysis was conducted. Frazier et al., (2004) defines mediating variables as constructs that “establish how or why one variable predicts or causes and outcome variable” (p. 116).

In this study, SEM analysis was carried out following the six-step approach recommended by Hair et al. (2010), as shown in figure 5.5 below. In SEM, researchers firstly need to define each construct, develop the overall measurement model, and design a study to produce empirical results. These three steps have been undertaken already as shown in the previous chapters. The rest of this chapter mainly follows stages 4 to 6,

namely, the assessment of the measurement model validity, the specification of the structural model, and the assessment of the structural model validity. IBM Amos for Windows version 22 was used to perform SEM.

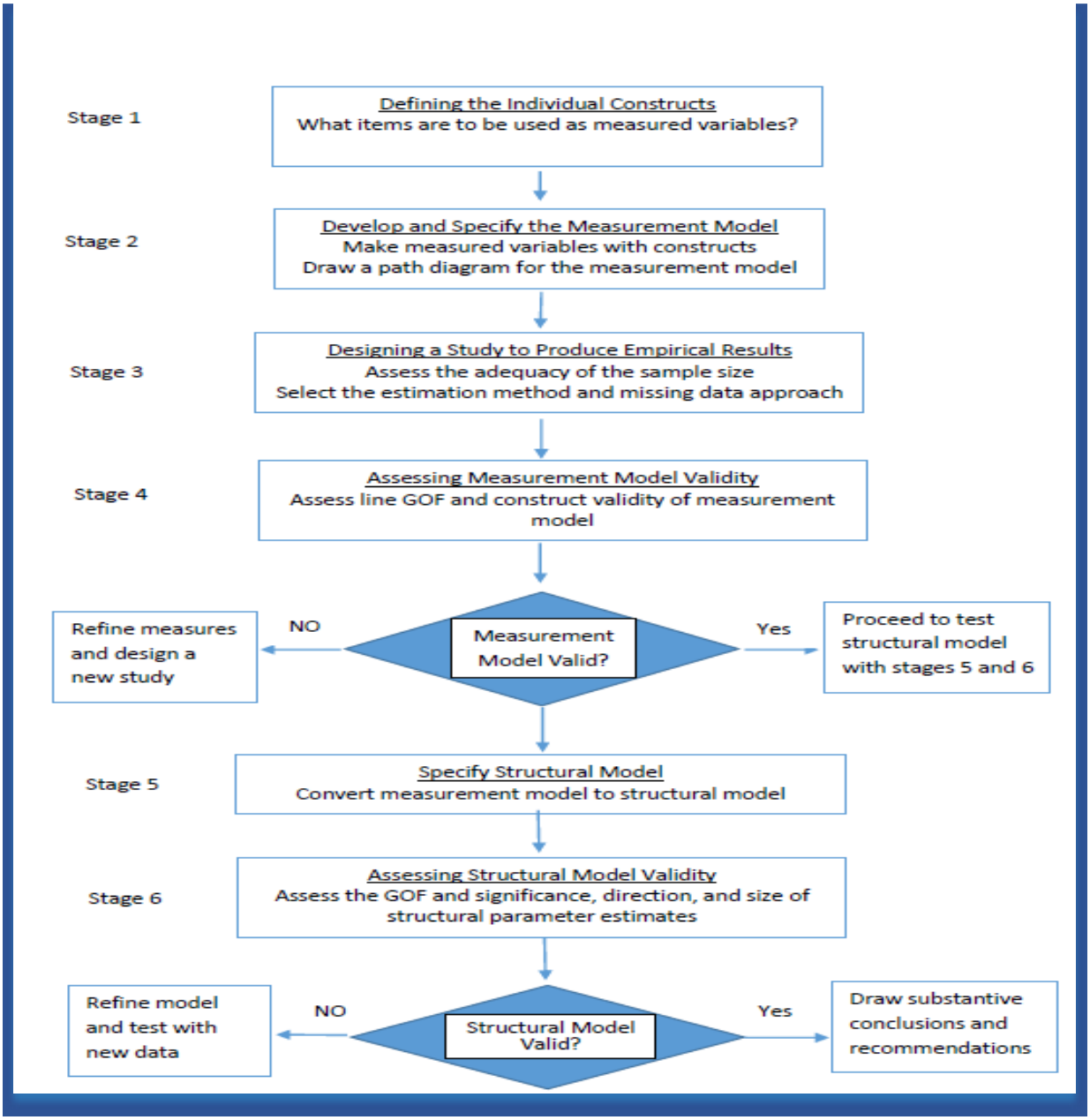

Figure 5. 5: Six-stage process for structural equation modelling (Hair et al., 2010).

Maximum likelihood (ML) is the default estimation method in AMOS and certainly in many statistical packages. It has been described as the most effective and useful technique for estimation

(Klein and Moosbrugger, 2000; Hayashi et al., 2007). The ML was employed as the method of estimation in this research due to its consistency in generating efficient estimation.

5.5.3.1 Assessing the measurement model

Preliminary data analysis in this chapter shows an overview of the data collected. The next stage is to assess the measurement models. According to Hair et al. (2010, p. 646), measurement model validity depends on "establishing acceptable levels of goodness-of-fit for the measurement model and finding specific evidence of construct validity". It needs to be assessed in two ways: first, by assessing the reliability, convergent validity and discriminant validity of the constructs; and second, by examining the path (parameter) estimates (Shah and Goldstein,2006).

Confirmatory factor analysis (CFA) is conducted to evaluate the measurement model. The purpose of CFA is to "test the degree to which a researcher's priori, theoretical pattern of factor loadings on pre-specified constructs (variables loading on specific constructs) represents the actual data" (Hair et al., 2010, p. 671). CFA is different from Exploratory Factor Analysis (EFA), which is used to explore the interrelationships among a set of variables at the early stages of research (Kline, 2013). In conducting EFA, the researchers usually do not have a priori developed constructs, rather, they depend on the EFA results to form constructs and determine their number.

Three factors need to be considered when performing CFA analysis: a) the number of measurement items for each construct (there should be at least three); b) the significance of each measurement item; and c) the criteria of overall measurement model fit. Adjustments should be made before a satisfactory model is obtained. The same procedures were applied in this study. Table 5.25 summarizes the CFA results. It is apparent from the table that measurement items recorded acceptable factor loadings (greater than .5), which will enhance the overall model fit (Hair et al., 2010). In addition to the factor loadings, the Cronbach's alpha and average variance extracted (AVE) for each construct are also presented in table 5.25 as evidence of constructs validity and reliability.

Therefore, support was found for the composite reliability and convergent validity in our measurement model as suggested by (Fornell and Larcker, 1981). Similarly, in order to establish discriminant validity, the square root of the construct's average variance extracted with the constructs correlation were equally compared, as recommended by (Fornell and Larcker, 1981). The entire constructs' correlations were found to be less than the square root of the average variance extracted for individual construct. Thus, support has been found for discriminant validity.

Prior to conducing SEM, it is essential to determine whether the estimated model has a good fit or not. The main factor of a good model is the fit among covariance matrixes. According to the rule of thumb, good-fitting model may be indicated when the ratio of the x2 to the degree of freedom is less than "3" (Tabachnick and Fidell, 2012; Hair et al., 2014). Even though SEM generates numerous fit indices, to discuss all of them will be superfluous. Hair et al. (2010) states that after running a SEM analysis, it is vital to show evidence of model fit using three or four indices. Nonetheless, researchers often do not report all the suggested three or four indices because of the overlap amongst the various indices. In the current study, supporting evidence of model fit is indicated by the CFI and RMSEA. These two were selected due to their sensitivity to model specifications and do not rely on sample size like the chi-square test (L. Hu and Bentler, 1999). In this study, the fit indices for the measurement models 1, 2, and 3 are within the acceptable range of goodness of fit (GOF), indicating a good fit between our data and the measurement model.

Table 5. 25: CFA results

Label	Observed variables	Cronbach's alpha	Factor loading	Average variance extracted (AVE)
Organizational culture	-	**.776**		**.603**
OC1	Team-oriented		0.715	
OC2	People-oriented		0.828	
OC3	Supportive		0.622	
OC4	Cohesive		0.714	
OC5	Innovative		0.859	
OC6	Risk-taker		0.975	
OC7	Flexible		0.918	
OC8	Visionary		0.936	
OC9	Structured		0.722	
OC10	Predictable		0.665	
OC11	Formalized		0.850	
OC12	Stable		0.772	
OC13	Goal achiever		0.631	
OC14	Competitive		0.770	
OC15	Results-oriented		0.821	
OC16	Opportunistic		0.652	
QOM	-	**.932**		**.755**
QOM1	Discipline		0.843	
QOM2	Top management commitment towards improvement		0.799	
QOM3	Experts in management team		0.854	
QOM4	Sustainability-related training		0.910	
QOM5	General level of education		0.875	
Business size	-	**.827**		**.648**
BS1	Annual turnover		0.937	
BS2	Number of trained employees		0.922	

BS3	International reach		0.761	
BS4	Number of office locations		0.894	
SSCM practices	-	**.791**		**.789**
Sustainable design				
SD1	Eco-labelling of products		0.853	
SD2	ISO 14001 certification		0.930	
SD3	We use environmental management systems		0.948	
SD4	Cleaner productions		0.941	
SD5	Design products for recycle		0.897	
SD6	Design products to avoid use of hazardous materials		0.866	
SD7	Design products for reduced consumption of energy		0.835	
Sustainable procurement				
SP1	We select suppliers based on their social and environmental skills		0.911	
SP2	We select suppliers based on their ability to support our social and environmental objectives		0.871	
SP3	We select suppliers based on their ability to create environmentally friendly products		0.852	
SP4	Environmental audit for supplier's internal management		0.822	
SP5	Providing design specification to suppliers that include environmental requirements for purchased items		0.823	
Investment recovery				
IR1	Sale of excess inventories or materials		0.919	
IR2	Sale of excess capital equipment		0.865	
IR3	Sale of scraps		0.785	
IR4	Sale of used materials or by-products		0.806	
Sustainable distribution				
SDT1	Cooperation with customers for using less energy during product transportation		0.655	
SDT2	Use of renewable energy in the process of products packaging		0.664	
SDT3	Use of renewable energy in any mode of products transportation		0.701	
SDT4	Cooperation with suppliers to reduce emissions during product transportation		0.685	
SDT5	Cooperation with suppliers to improve their waste reduction during product packaging		0.798	
Social sustainability practices				
SSP1	Employee skills development		0.898	
SSP2	Health and safety training for employees		0.913	
SSP3	Community investment		0.926	
SSP4	Sustainable working condition for employees		0.952	
SSP5	Protecting human rights		0.880	
Business performance	-	**.829**		**.645**
Operational performance				
OP1	Proactivity		0.751	
OP2	Innovation		0.792	
OP3	Flexibility		0.766	
OP4	Speed		0.734	

OP5	Low costs		0.850	
OP6	Quality		0.809	
Environmental performance				
EP1	Wastewater reduction		0.788	
EP2	Carbon footprint reduction		0.867	
EP3	Reduction of air pollution		0.876	
EP4	Reduction of energy used		0.823	
EP5	Reduction of water used		0.727	
EP6	Reduction of solid waste		0.853	
EP7	Decreased use of hazardous materials		0.921	
Economic performance				
ECP1	Net profit		0.764	
ECP2	Return on sales		0.875	
ECP3	Return on investment		0.874	
ECP4	Market shares		0.908	
ECP5	Improvement in firm's image		0.862	
ECP6	Decrease in cost of materials purchased		0.783	
Social performance				
SOP1	Improved employee health and safety		0.937	
SOP2	Improved stakeholder welfare		0.949	
SOP3	Improved community investment		0.851	
SOP4	Reduced environmental impact to the public		0.836	
SOP5	Improved community health and safety		0.910	

5.5.3.1.1 *Assessing common method bias*

The issue of common method bias was addressed before conducting the SEM analysis. When researchers collect data from participants using survey questionnaire at the same time, the problem of common method bias may be encountered (Kamakura, 2010). Therefore, the common method bias is mainly concerned with the measurement instruments and not the variables being measured. In designing the questionnaire used in this study, a number of steps were followed to ensure that common method bias was avoided.

Firstly, the questionnaire was rigorously pre-tested and as a result, the 'item characteristic' effects were reduced significantly. This enabled the researcher to modify the questionnaire items in a way that could be easily understood. Secondly, the confidentiality of respondents was assured when developing the online survey, which helps mitigate the problem of 'common rate' effects. Thirdly, the possibility of common method bias was also minimised through the use of Likert-type scale questions, as suggested by Field (2009). Fourth, one of the most commonly used statistical methods for assessing common method bias, the Harman's single factor test, was carried out using SPSS software to assess the probability of the common method bias problem. In doing so, a factor analysis with all the measurement items was conducted by limiting the number of factors to one

and using the unrotated factor key. The test we ran provides evidence that the maximum variance explained by a single factor was 25.9%, less than the suggested 50% (Podsakoff et al., 2003). This implies that a single factor accounts for about 26% of variance, indicating that a single factor does not account for the majority of the aggregate variance. Consequently, it can be concluded that the data from the survey was not affected by the common method bias problem.

5.5.3.2 Assessing the structural model

After assessing the measurement model and making necessary adjustments (stage 4), the structural model should be specified (stage 5). According to Hair et al. (2010), specifying the structural model involves assigning relationships from one construct to another based on the theory. The structural models in this study have been well built as discussed in Chapter 4. The SEM test thus moves on to the last stage, i.e., the assessment of the structural model.

The assessment of the structural model is similar to the process of assessing the measurement model with two differences. First, acceptable model fit indices should be ensured. Second, the estimated parameters deserve special attention because they are the most important indicators of the hypothesized relationships depicted in the structural model (Hair et al., 2010). In this regard, whether the hypotheses are supported by the results of data analysis depends on the value and statistical significance of the parameters.

5.5.3.2.1 Structure model: Conceptual framework validation

The structural model illustrates the relationships between organisational factors (corporate culture, business size and QOM), SSCM practices, and business performance. Table 5.26 summarizes the fit indices of the structural model, which indicates that the GOF indices are within the recommended cut-offs. In particular, the normed chi square is 1.96, the CFI is 0.97, and the RMSEA is 0.49. Thus, it can be concluded that structural model achieves acceptable fit. The next stage of the structural model assessment focuses on simultaneous hypotheses testing, in order to validate the research framework proposed in chapter 3.

Table 5. 26: GOF indices of the structural model 3

	Normed Chi square	CFI	RMSEA
Research model 3	1.96	0.97	0.49

Since the difference between the measurement model and the structural model in the indices is not substantial, and the requirements for acceptable model fit is met, it can be concluded that the structural model fits the data well. The next stage of structural model assessment is to examine the hypothesized relationships. The strength, direction, and significance collectively determine the validity of the structural model in addition to the fit indices.

A structural equation model of the relationships between the main research constructs is shown in the Amos output presented in figure 5.6. It is apparent from the structural model that there is a direct positive relationship between organisational culture and SSCM practices with a path coefficient of 0.44 ($p < 0.05$). Similarly, the path coefficient between QOM and SSCM practices is 0.34 ($p < 0.05$), indicating a direct significant relationship between them. On the other hand, business size is not significantly related to SSCM practices with a path coefficient of 0.12 (ns). While the relationship between SSCM practices and business performance was found to be statistically significant with a coefficient of 0.92 ($p < 0.01$), the relationships between organisational culture and business performance, and between QOM and business performance were found to be insignificant with a coefficient of 0.09 and 0.09 respectively.

This finding confirms that SSCM practices fully mediates the effect of organisational culture and QOM on business performance, by which the effect of SSCM practices determines the business performance much more than organisational culture and QOM. Therefore, the result of the structure model generally supports the proposition of this study, that strong organisational culture and QOM leads to the implementation of more SSCM practices and thus affects business performance.

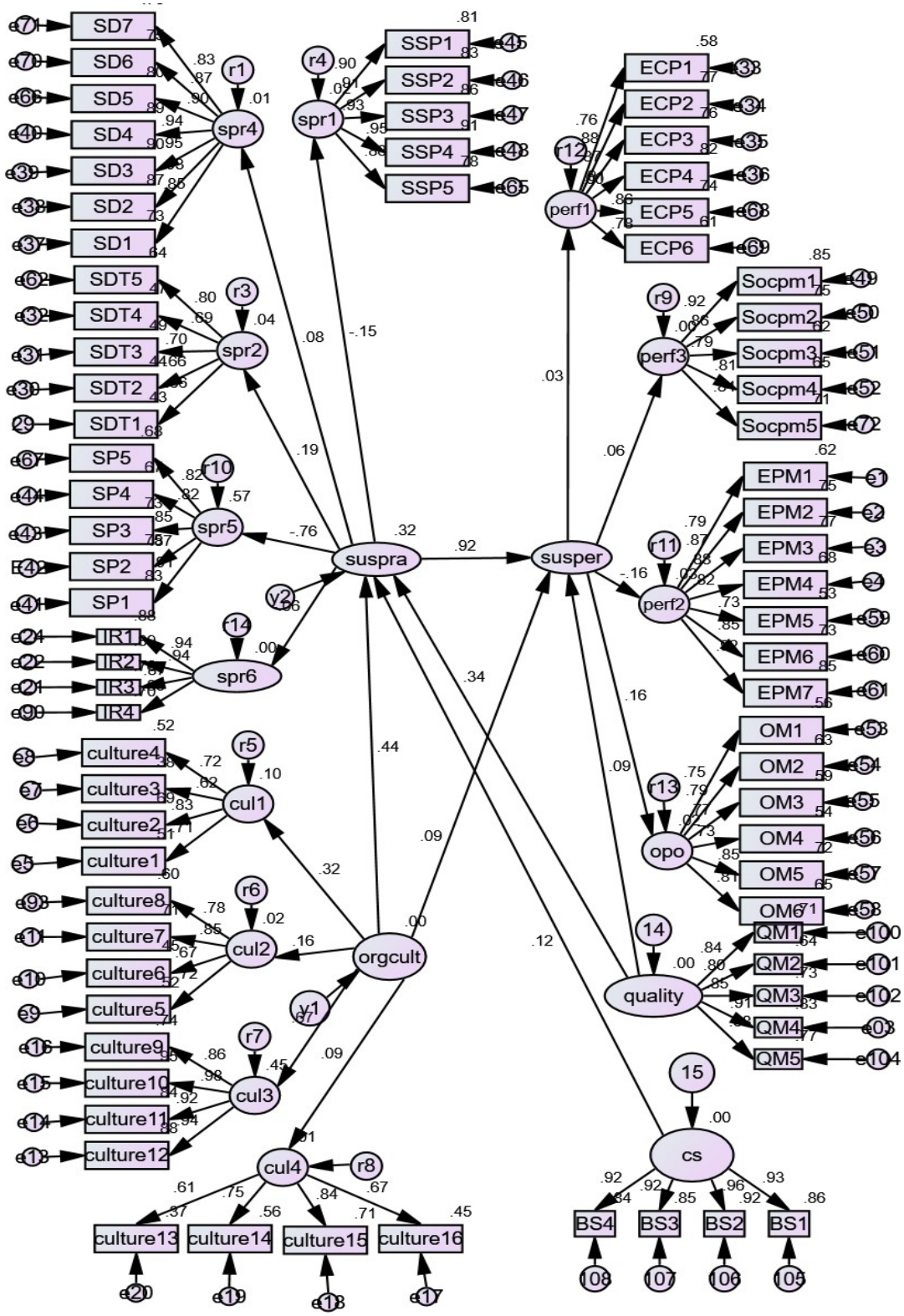

Figure 5.6: Amos output of structural model of this study

In addition, the finding from this study implies that organisational culture is only linked to superior performance when it is embedded with norms and values that enable firms to adapt to the changes in environmental conditions. Similarly, the higher the QOM in a firm, the greater the implementation of SSCM practices, which in turn improves the overall performance of the organisation.

Consequently, the structural model affirms the conceptual model presented in chapter 3. In the same vein, it is apparent from the path model that in the surveyed organisations, SSCM practices have a positive direct effect on business performance.

5.6 Conclusion

This chapter reported the outcomes of the survey by questionnaire carried to investigate and authenticate the research objectives and questions that this study set out to achieve. The results of the analyses conducted specifically revealed an association between organisational factors (corporate culture, business size, and QOM) and SSCM practices and their strong influence in driving the performance of firms in the oil and gas industry. Similarly, it has also proved that organisational culture and QOM, when mediated through SSCM practices, leads to a much greater firm performance as indicated by the mediation models. The next chapter is chapter six, which provides detailed discussion of the research questions, and the data analysis techniques employed to answer each question.

Chapter 6: Discussions

6.1 Introduction

This chapter offers a detailed explanation of the results in Chapter 5 and the research questions. The chapter also outlines the research objectives and implications of the study. Additionally, the study demonstrates how the results were generated by providing the findings and justifications.

6.2 Research questions

This research investigated the effects of organisational factors (corporate culture, business size, and QOM) on SSCM adoption, and performance outcomes of SSCM in the oil and gas sector. Implementation of SSCM practices is deemed as an important approach through which firms in the industry can improve their overall performance. The study consists of four research questions. In order to answer these questions, a quantitative method – survey by questionnaire was adopted. The data collected from the survey was analysed using SPSS and AMOS software. Details of the findings have been presented in Chapter 5 of this thesis.

6.3 Findings of the research

Correlation analysis, regression analysis and SEM technique were conducted in order to answer the questions of the study and validate the conceptual framework. The research questions and relevant findings are as follows:

6.3.1 Research question 1: Effects of organisational culture, size and QOM on SSCM practices

This research question employed correlation analysis and SEM technique to establish the association between organisational factors (corporate culture, business size, and QOM) and SSCM practices.

6.3.1.1 Effect of organisational culture on SSCM practices

This study has offered a detailed evaluation of organisational culture and its link to SSCM implementation. In doing so, this study examined what constitutes a sustainability-oriented organisational culture by using the traditional notion of corporate culture. Howard (1998) and Wan Ahmed et al. (2016) classification of culture has provided an access point for discussing 'how and why' the ideological foundation of organisational culture affects the way SSCM practices are implemented and the kinds of benefits that can be attained, which ranges from a focus on workforce development, economic profitability, environmental protection, and stakeholder engagement.

Several studies have pointed out that management decisions and actions are crucial to the implementation of SSCM practices (Dai et al., 2021; Su et al., 2021). Nevertheless, despite the consensus among most scholars that organisational culture and values are essential aspects for the realization of SSCM agenda, there is a lack of research on the link between organisational culture and sustainable practices, especially in the oil and gas sector. Majority of the previous studies are either non-empirical or industry specific.

The findings of significant positive relationship between organisational culture and SSCM practices in the oil and gas sector is an important contribution to the growing stream of SSCM research in the sector. Table 5.7 shows a significant correlation between organisational culture and the adoption of sustainable practices. This is consistent with the SEM results, which indicates that the path coefficient between organisational culture and SSCM practices is statistically significant at 0.36. Thus, it can be argued that the ability of firms to nurture a culture that supports sustainability may lead to the development of sustainable products with least negative environmental impacts. Many scholars believe that firms with sustainability cultures are more

likely to implement SSCM practices beyond regulatory standards (Pagell and Wu, 2009; Wan Ahmed et al., 2016).

The quantitative result in table 5.9 reports a complementary outcome that indicate the surveyed firms are deep-rooted with a strong level of culture that promotes teamwork, competition, innovation, risk-taking, stability and supportiveness. These features are very vital in organisations, especially those with operations in highly competitive business environment such as the oil and gas sector, which is always under immense pressure to enhance their sustainability performance.

The findings in table 5.9 provide evidence that organisations with innovative and risk-taking cultures are positively related to the implementation of sustainability initiatives. This is consistent with previous studies (Linnenluecke and Griffiths, 2010; Su et al., 2021; Wan Ahmed et al., 2016). Innovative firms have been found to be at the forefront of introducing numerous sustainable initiatives across their supply chains to minimise negative environmental impacts (Linnenluecke and Griffiths, 2010; Yusuf et al., 2013), while risk-takers tend to focus more on making long-term sustainability investments, rather than focusing on achieving immediate or short-term gains (Wan Ahmed et al., 2016).

Team-oriented and people-oriented cultures have recorded some significant association with SSCM practices. Nevertheless, the inward concentration of these cultural attributes is based on the ideologies and theories that emphasise financial growth (Zammuto et al., 2000; Scott, 2003), which will likely promote the attainment of economic goals only, neglecting the social and environmental aspects. Thus, firms with these types of cultural characteristics must strive towards ensuring a balance among the TBL elements in order to be truly sustainable.

Supportive culture was found to be positively related to the implementation of sustainability practices. This finding is consistent with (Carter and Rogers, 2008; Pagell and Wu, 2009; Hong et al., 2022) who stated that, supportive organisational culture is a vital aspect of SSCM because it can facilitate the adoption of sustainable practices in firms. Hong et al. (2022) further stressed that an organisational culture that promotes supportiveness can assist oil and gas corporations to build unique capabilities that can enhance environmental management, and health and safety, which in turn, will equip them with dynamic competencies to effectively deal with the complexities within the business environment. Therefore, supportive organisational culture is crucial to the implementation of SSCM initiatives in the oil and gas sector.

Stability in organisations has also been found to have statistically significant correlation with SSCM practices. This can be attributed to firms 'desire to reduce pressure from investors and manage both financial and environmental risks (Walker et al., 2008). For example, financial instability can cause economic risks (Ahmad et al., 2017), and such uncertainties may hinder firms' commitment to SSCM practices (Halldórsson et al., 2009).

From the results in table 5.9, there is evidence that results-oriented and competitive cultures have a significant positive correlation with the implementation of SSCM practices. On one hand, results-oriented culture is believed to have a great emphasis on profitability. This goal, which is aligned with the focus of SSCM to reduce cost (Carter and Dresner, 2001) and enhance firm performance (Luthra et al., 2016; Paulraj et al., 2017; Mukhsin and Suryanto, 2022), can push results-oriented organisations to implement SSCM practices. On the other hand, companies with a competitive culture also have a high tendency to implement SSCM initiatives. This is supported by Seuring and Mueller (2008) who argued that firms' SSCM strategy can be influenced by competition. In this regard, competition is often classified as a driver of SSCM in existing literature (Noori and Chen, 2003; Zhu and Sarkis, 2006).

Structured culture was found to have a partial relationship with SSCM practices. This finding is inconsistent with the position of a previous study (Linnenluecke et al., 2009) which noted that, an organisation that place much emphasis on formalised decision-making has a higher inclination to implement SSCM practices. Our findings reveal that structured culture is only related to sustainable distribution and social sustainable practices.

Although flexible culture was found to have an insignificant correlation with four of the SSCM dimensions (sustainable procurement, investment recovery, sustainable distribution and social practices), it recorded a statistically significant relationship with sustainable design. This is rather an interesting finding. However, it appears to be in line with (Zammuto et al., 2000; Zammuto, 2005) assertion that, flexible firms tend to place more emphasis on coordination, internalization of beliefs and training to achieve specific goals. This explains why organisations with a highly flexible culture are positively related to sustainable design activity.

Predictable and opportunistic culture were observed to be incompatible for the implementation of sustainability practices. Predictable culture is positively related to only investment recovery, while opportunistic culture is associated with only investment recovery and social practices. Firms with

these types of cultures pay more attention on organisational growth and resource acquisition (Linnenluecke et al., 2009; Linnenluecke and Griffiths, 2010). This ideology may likely undermine their commitment towards environmental and social practices.

The implication of this research therefore is that managers seeking to improve the sustainability performance of their organisations must focus on how to develop strong sustainability culture. For example, organisations can nurture cultural features that not only allow innovativeness, risk-taking and competitiveness, but also empower the pursuit of long-term value through proactive sustainability investments and not engaging in mere environmental compliance strategies. In other words, it is important for firms to create new competences that will enable them to innovatively deal with environmental issues. In utilising the abilities and skills, firms should build better collaboration with members of their supply chain and shareholders to lessen the associated risks in their business operations. Generally, the findings are consistent with previous studies (Walker and Jones, 2012; Tsai et al., 2021; Hong et al., 2022) which observed that firms' implementation of sustainability practices is mainly driven by a sustainability culture. However, this study provides a novel insight into the cultural characteristics needed to effectively improve the sustainability performance of corporations in the oil and gas sector.

6.3.1.2 Effect of business size on SSCM practices

The size of a company has significant implications on the availability of skilled employees and financial resources. Human and material resources are vital for the successful implementation of sustainability practices, as the cost of sustainability investments can be substantial (Zhu et al., 2008). Consequently, bigger companies that possess sufficient financial resources are considered to be in a better position to achieve a successful implementation of SSCM practices and realise its full benefits.

The results in table 5.10 provide evidence that companies with high annual turnover are positively associated with the implementation of sustainability practices. This finding is supported by the resource-based view of organisations (Barney, 1991) which contends that, bigger companies often have more financial resources and competences to effectively manage environmental concerns. Similarly, Del Brío and Junquera (2003) states that companies with bigger yearly turnover could afford to assign additional material resources towards sustainability pursuit. Thus, financial capability is a major determinant of SSCM adoption.

Firms that provide relevant environmental training to their workforce were found to be positively associated with the implementation of sustainability practices. This finding is consistent with (New et al., 2000; Oelze, 2017; Bratt et al., 2021) perspectives that suggests the importance of having the necessary knowledge before adopting SSCM practices. They argued that a lack of sustainability knowledge at any stage of the supply chain can hinder a firm's capability to successfully handle environmental and social problems.

International reach and number of office locations were also found to be related to sustainability implementation. Since the activities of O&G companies transcends different international boundaries (Clemente et al., 2005; Yusuf et al., 2014), they are likely to encounter various environmental regulations and requirements from many stakeholder groups. The significant effect of companies' international reach and office location on SSCM practices is consistent with (Garcés-Ayerbe et al., 2012) who states that, firms are often more hands-on towards sustainability practices when their faced with bigger pressure from the external environment. International reach, according to Wan Ahmed et al. (2017), can force multinational companies to strive towards becoming sustainable in their operations, as they are often subjected to different environmental policies and regulations.

The implication of these findings is that, while some firms possess huge resources to implement a bundle of sustainable initiatives, others can only make efforts to meet regulatory standards because of their financial limitations. Considering this, small and medium enterprises (SMEs) in the O&G industry must explore possible ways of resource development and engage in collaborative sustainability drive with their supply chain partners in order to effectively address environmental and social concerns. On the other hand, the SEM results in figure 5.7 (path diagram) indicate that the path coefficient between business size and SSCM practices is not significant statistically, which contradicts the correlation results in table 5.10. This is a rather interesting finding that creates a need for further research to be conducted on the perceived relationship between the two variables.

6.3.1.3 Effect of QOM on SSCM practices

According to Walker and Jones (2012), in order to effectively implement SSCM practices, organisations must concurrently balance external adaptability with internal harmonisation, as well as achieve a combination of bottom-up coordination with top-down involvement. These principles

are expected to be fostered by the top management and then disseminated among members of the organisation. Thus, QOM is an important aspect of sustainability implementation in the oil and gas industry.

Even though empirical evidence has shown that top management commitment is essential for SSCM adoption (Seuring and Mueller, 2008; Harms et al., 2013; Zhu et al., 2013), yet there is a lack of studies on the relationship between the QOM in an organisation and the implementation of sustainability practices. Understanding the role of QOM in sustainability drive can help O&G companies to develop the necessary competences for the implementation of sustainability initiatives and dealing with the continuous changes in the business environment effectively.

The results in table 5.11 indicate that the level of discipline in organisations is positively related to sustainable design and sustainable procurement initiatives. This finding seems to be novel in the literature because previous empirical evidence in this regard has not been found. But, in the related field of CSR, Carter and Jennings (2004) found a significant correlation between individual values of organisational members and the implementation of CSR practices.

Top management commitment recorded a significant positive relationship with all the SSCM dimensions. This result is supported by previous studies (Wittstruck and Teuteberg, 2012, Hussain, 2011, Walker and Jones, 2012), which highlighted the importance of the support and commitment of top managers in the design and implementation of sustainability strategy. These findings mean that, in the surveyed organisations, SSCM strategies are enforced by the top management who also ensure the success of such initiatives through a bottom-up involvement across different hierarchies of the organisation.

Sustainability-related training also recorded a significant positive correlation with all the SSCM dimensions. This finding is in line with (Gonzalez-Benito and Gonzalez-Benito, 2006; Oelze, 2017; Kassaneh et al., 2021) who argued that the firms' commitment towards SSCM practices depends on the degree of environmental awareness of its managers. Thus, companies that have environmentally aware managers will have higher inclination to implement proactive SSCM practices.

Experts in management team and education level were also found to have significant positive correlation with the implementation of sustainability initiatives. Interestingly, the results show that

the strongest correlation was recorded between education level and sustainable distribution, indicating that the higher the knowledge accumulation in an organisation, the greater likelihood that sustainable distribution capabilities may develop. However, although discipline was found to be related with sustainable design and sustainable procurement, it displayed negative correlations with investment recovery, sustainable distribution and social sustainability practices. These results suggest that expertise and knowledge accumulation in organisations can facilitate the development of environmental and social practices. While there is no previous empirical evidence in this respect, our findings can be supported by Feldman (2009), who found that education level is positively related to innovation. Therefore, drawing from table 5.11 and the empirical support Feldman (2009), it is apparent that the higher the knowledge accumulation in an organisation, the greater the implementation of proactive sustainability practices.

In addition, the SEM results in table 5.29 indicate that the path coefficient between QOM and SSCM practices is statistically significant at. Therefore, it can be argued that the higher the QOM in an organisation, the greater the implementation of SSCM practices. In other words, firms with perceived QOM will put more emphasis on greater social and environmental practices.

The implication of the above findings is that, in order to make sure the sustainability strategy designed to address the effects of firms' activities is supported by organisational members, the overall QOM in a firm needs to be overhauled and improved significantly.

6.3.2 Research question 2: Effect of organisational culture and QOM on business performance

This research question employed correlation analysis and regression analysis to establish the impacts of organisational culture and QOM on business performance.

6.3.2.1 Effect of organisational culture on business performance

Organisational culture is viewed as a fundamental aspect of a company and a significant driver of performance (Hong et al., 2022). It is vitally important for O&G companies aiming to maximize their performance in today's business environment that is characterized by intense competition to have a deep understanding of culture and how to use it as a competitive weapon. The resource-based theory posits that the degree to which a culture can contribute to competitive benefits depend on the value, rareness, and uniqueness of the culture (Barney, 1991).

Table 5.12 shows that organisational culture is positively related to all the performance outcomes, with the strongest correlation coefficient on social performance. This is rather an interesting finding as majority of the previous studies on organisational culture have only attempted to link it to financial/economic performance. For instance, attempts by researchers to clarify the continuous economic performance of companies such as Mc-Donald's and IBM concentrated on the norms and values entrenched in the cultures of these firms (Barney, 1991; Jargin and Slocum, 2007). Nevertheless, the finding of significant positive relationship between organisational culture and social performance further attests to the potential of organisational culture in influencing the performance of firms.

Similarly, organisational culture also recorded significant correlations with economic performance, environmental performance and operational performance. These findings therefore implies that it is essential to exploit the numerous advantages that could be provided by culture, rather than paying attention to only the tangible aspects of the organisation. Furthermore, in the regression model reported in table 5.22, it is apparent that 6.2% of variance in firm performance is explained by "organisational culture". This finding is supported by (Martin, 2001; Jarnagin and Slocum, 2007) who argued that companies with sustained performance usually have strong cultural norms and values that describes the way they operate.

The results in table 5.13 show that some cultural characteristics are positively related to performance outcomes, while others recorded insignificant correlations with performance outcomes. Firms that have nurtured cultural characteristics such as team orientation, supportiveness, stability, flexibility, formalisation, and results orientation were found to have significant positive relationships with specific performance outcomes. This finding is supported by (Burt et al., 1994; Lee and Yu, 2004) who argued that, the performance outcomes of having strong corporate culture comes from multiple implications of having strongly held and widely shared norms and values: greater control and harmonisation in the company, orientation towards mutual organisational objectives by workforce and shareholders, and enhanced workforce motivation.

Notably, the most important findings from the correlation analysis in table 5.13 indicate that both competitive and innovative cultures recorded positive correlation with all the four performance outcomes. Interestingly, the distinguishing feature of competitive and innovative cultures is the

emphasis each puts on viable external positioning and responsiveness. These results are consistent with earlier studies (Slater and Narver, 1994; Greenley, 1995; Ogbonna and Harris, 2000) which maintained that externally oriented corporate cultures are positively associated with performance. In contrast, predictable and opportunistic cultures are not significantly correlated to any of the performance outcomes. Previous studies have suggested that strong cultures contribute to company success (DiTomaso, 1987; Kotter and Heskett, 1992; Weiner, 1988). However, the results of this study provide evidence that not all types of organisational culture are positively linked with firm performance. Specifically, predictable and opportunistic cultures are not directly linked to performance. Nevertheless, it should be noted that the results in table 5.12 show that "aggregate" organisational culture correlates positively with all the performance outcomes.

The implication of this finding is that the performance of an organization is dependent on the extent to which its cultural values are widely shared, that is, are strong. Thus, firms must strive towards strengthening their culture through ensuring that organisational norms and values are widely shared among organisational members in order to achieve improved productivity and performance. This is because the performance outcomes of having strong corporate culture comes from multiple implications of having strongly held and widely shared norms and values: greater control and harmonisation in the company, orientation towards mutual organisational objectives by workforce and shareholders, and enhanced workforce motivation.

6.3.2.2 Effect of QOM on business performance

QOM is considered as a necessary antecedent to organisational performance. Despite efforts by top managers to evade blame for low performance, research has shown that management are always held responsible whenever performance fails, and that poor performance affect perceptions of management quality (Brown, 1982). Thus, understanding the role of QOM in facilitating or hindering organisational performance is important for O&G companies seeking to leverage on their existing capabilities and resources to enhance their performance.

While the resource-based theory of organisation holds that the possession of VRIN competences and resources simultaneously is the key to competitive advantage (Barney, 1991), the dynamic capabilities view (DCV) suggests that organisations' capability to create and reconfigure resources to continuously adapt to the changing business environment determines competitive advantage (Bromiley and Rau, 2014; Lin and Wu, 2014). In this regard, idiosyncratic firm capabilities such

as QOM play a vital role in the attainment of greater performance and ultimately achieving a competitive advantage.

The correlation results presented in Table 5.15 highlights the apparent influence of QOM on business performance outcomes in general. Similarly, the regression model reported in table 5.22 further confirms that QOM has a huge effect on the performance of the surveyed organisations, indicating that 18.1% of variance in firm performance is explained by "QOM". Therefore, the finding of positive relationships between QOM and business performance implies that, organisations with more management capacity will typically have the ability to perform better than organisations with less management capacity. Thus, one of the primary responsibilities of top managers is to shape their organisational context effectively to maximise the performance of their firms (Ghoshal and Bartlett, 1994),.

The results in table 5.15 indicate that discipline is positively associated with operational performance. This finding is consistent with (Redeker, 1983) who states that, discipline in a company enhances operational efficiency and creates a sense of cooperation and harmony among personnel, which are critical to improving productivity. Interestingly, discipline recorded an insignificant relationship with economic, social and environmental performance.

Top management commitment was found to have a positive correlation with all the four performance outcomes. This discovery is consistent with existing studies (Ramus, 2001; Haque and Anwar, 2012; Lo et al., 2016) which highlights the important role of managers in driving performance, noting that company success depends on the degree of commitment by managers to create an effective organisational context through employee involvement, coordination and teamwork.

Experts in management recorded a positive correlation with economic, social, and operational performance, as indicated by the results in table 5.15. This finding is consistent with previous works (Reuber, 1997; Rau, 2002; Kassaneh et al., 2021), which suggested that the higher the know-how of managers, the greater the performance of organisations. However, it is rather interesting that management expertise was found not to be related to environmental performance.

Sustainability-related training recorded significant positive correlation with all the four performance outcomes. This result is supported by previous studies (Hanna et al., 2000; Ramus,

2001; Fernandez et al., 2003), which pointed out the role of employee environmental training in terms of achieving greater environmental performance and productivity.

Education level also recorded significant positive correlation with all the four performance outcomes. This finding is consistent with a prior empirical study that found positive relationship between education level and organisational performance (Bhagat et al., 2010).

The implication of this finding is that the improvement of business performance is largely reliant on the commitment and capacity of the management. In other words, the higher the QOM in an organisation, the greater the capacity to perform, and that the inability to perform effectively could be a consequence of poor management quality. This is generally based on the assumption that performance is the ultimate management responsibility. Thus, it is essential for managers to utilise their full potentials in developing the necessary capabilities needed to transform their organisation and adapt to the rapidly changing environment, in order to achieve superior performance.

6.3.3 Research question 3: Effect of SSCM practices on business performance

This research question employed correlation analysis and regression analysis to examine the effect of SSCM practices on business performance.

Even though sustainability practices have been implemented by oil and gas corporations in the past two decades, it is still not clear whether these practices are executed because of the monetary value they generate or due to the intense pressure from various external forces. The correlation results reported in table 5.16 show that there is a positive association between SSCM practices and the four performance outcomes. The most noteworthy finding from the correlation analysis indicates that sustainability practices have a statistically significant correlation with "economic performance". This finding offers some clarity to the ambiguity regarding the impacts of sustainability practices on performance, such as the increasing argument on 'whether it pays to be sustainable', and further attests that the adoption of proactive sustainability practices will eventually yield profitability thereby improving the financial performance of firms. Interestingly, the strongest correlation coefficient was recorded among sustainability practices and "operational performance". This result is supported by (Yusuf et al., 2013; Kottala et al., 2021; Khan et al., 2021), who observed improvements in operational performance due to the implementation of sustainability practices in the oil and gas supply chain.

More so, SSCM practices also correlates positively with "environmental performance". Generally, the existing literature on the relationship between sustainability adoption and environmental performance is very clear. Some previous studies (Esfahbodi et al., 2016; Paulraj et al., 2017; Mukhsin and Suryanto, 2022) have shown that the implementation of sustainability practices in supply chains improves companies' environmental performance. In the same vein, the finding of positive association amongst sustainability practices and "social performance" seem to indicate that, investments in SSCM initiatives are not necessarily associated with economic benefits. Other intangible aspects such as customer satisfaction, employee job satisfaction, employee engagement, and community developments are relevant to organizations but are more difficult to quantify in terms of monetary value (Savitz and Weber, 2014).

The results in table 5.17 indicate that sustainable design is positively correlated to economic, environmental, and operational performance. These findings are in line with the results of previous studies (Esfahbodi et al., 2016; Fathollahi-Fard et al., 2022), which provides empirical evidence to support our findings. Grote et al. (2007) states that sustainable design is aimed at reducing the ecological effects of a product, running costs, and maximising efficiency. On the contrary, sustainable design was found to be negatively associated with social performance, which suggests that the purpose of sustainable design may not have been achieved entirely. This finding can be supported by Green et al. (2012) who argued that sustainable design's capacity to minimise environmental and social impacts is often affected by increment in the related costs, possibly associated with purchase of materials.

The results in table 5.17 show that sustainable procurement recorded a positive correlation with economic performance, environmental performance, social performance, and operational performance. These results are consistent with the findings of similar empirical studies in different contexts (Paulraj et al., 2017; Sanchez-Flores et al., 2022). The practice of sustainable procurement is aimed at maximising value and profitability, while reducing negative environmental impacts. From an economic point of view, sustainable procurement lies with the supplier, instead of the producer. Therefore, it is believed to be less expensive for producers to adopt than other sustainability initiatives (Sanchez-Flores et al., 2022).

The results in table 5.17 show that investment recovery recorded a positive correlation with economic, environmental, and operational performance. These findings are inconsistent with the

results of Zhu and Sarkis (2007) who found that, although investment recovery has a positive relationship with economic performance, it is not significantly linked to environmental and operational performance. Equally, the results in table 5.17 also indicate that investment recovery recorded a negative correlation with social performance. Nevertheless, our findings seem to be supported by the results of recent studies (Green et al., 2012; Kottala, 2021), which provide evidence to corroborate the findings of this study.

The results in table 5.17 indicate that, although sustainable distribution recorded positive correlated with environmental performance, social performance, and operational performance, it is negatively related to economic performance. These results are consistent with the findings of Esfahbodi (2016), which shows that sustainable distribution has a positive impact on environmental performance but recorded a negative correlation with economic performance. In this respect, our findings imply that sustainable distribution is primarily aimed at reducing negative social and environmental impacts, as well as optimising logistical activities. Thus, it may not necessarily impact economic performance. Even though the work of Zhu and Sarkis (2007) found negative association among sustainable distribution and environmental and economic performance, a recent study (Green et al., 2012) found a positive link between sustainable distribution and environmental performance, which is in line with the results obtained in this study.

The results in table 5.17 show that, social sustainability practices correlate positively with economic performance, social performance (as expected), and operational performance. Interestingly, social practices were found to be not significantly linked to environmental performance. This is perhaps because other sustainability practices may account for improvements in environmental performance and perhaps not social practices. However, these results create a need for more empirical investigation of the relationship between social sustainability practices and environmental performance in order to either corroborate or reject the findings of this study.

According to the practice-based view, the performance difference among firms can be partially explained by the implementation of inimitable practices, which are publicly available and transferable across companies (Bromiley and Rau, 2016). In the surveyed organisations, 26.4% of variance in organisational performance is explained by the implementation of SSCM practices, as indicated in the regression model reported in table 5.22. This finding provides more insight into the ongoing debate relating to the overall impact of sustainability practices on business

performance. Consequently, it can be argued that the implementation of sustainability practices in the oil and gas sector contributes to the performance of firms.

The implication of this finding is that firms can achieve environmental, social, and financial performance simultaneously through the implementation of sustainability practices in their supply chains. To fully realise the benefits of SSCM, there is a need to change to a proactive sustainable production, which requires producers to consume fewer materials, energy, and water. Companies can achieve competitive advantage, enhance their economic sustainability, as well as promote environmental and social sustainability through designing sustainable products. Therefore, it is essential for managers to engage in more cooperative dealings with suppliers, consumers, and all critical shareholders so that environmental and social problems are effectively addressed.

6.3.4 Research question 4: Mediating role of SSCM practices on the link between organisational factors (culture and QOM) and business performance

This research question employed SEM technique to examine the extent to which culture and QOM affect performance indirectly through SSCM practices.

6.3.4.1 Organisational culture-SSCM practices-performance link

Even though the relationship between culture and performance has been established in the literature, there is a lack of adequate explanation on "how" and "why" this relationship exists. According to Frazier et al. (2004), mediating variables establish how or why one variable predicts or causes and outcome variable. Figure 5.6 reports the results of the direct and indirect relationships between organisational culture, SSCM practices, and business performance.

The SEM results in figure 5.6 indicates that the path from organisational culture to SSCM practices, and the path from SSCM practices to business performance are statistically significant. On the other hand, the path between organisational culture and business performance is not significant. Considering this finding, one can therefore question the universality of a culture-performance relationship in existing studies (Gordon and Ditomaso, 1992; Marshall et al., 2015).

The results of the mediation test in figure 5.6 reveals the mediating effect of SSCM practices in the culture-performance link. In other words, SSCM is one explanatory mechanism through which an organisation's underlying culture influence its performance. Thus, it is argued that organisational culture, when mediated through SSCM practices, yields greater firm performance.

This suggest that organisational culture is only linked to superior performance when it is embedded with norms and values that enable firms to address ecological and social concerns, as well as adapt to the changes in environmental conditions.

The implication of this finding is that organisational culture affects sustainability practices, which in turn, influence business performance. As pointed out by Linnenluecke et al. (2010), the implementation of sustainability practices would depend largely on the values and ideological underpinnings of a company's culture (Linnenluecke et al., 2009; Gupta and Kumar, 2013; Marshall et al., 2015; Hong et al., 2022), and that these ultimately affect the benefits that can be achieved. Our findings thus provide evidence that organisational culture is one explanatory factor that is responsible for the differences in performance benefits realised by companies implementing the same SSCM initiatives. Consequently, in order to realise improved performance, managers must nurture a strong sustainability culture that is embedded with norms and values that enable firms to effectively implement proactive SSCM practices across their supply chains and focus on maximising long-term value and not mere short-term financial gains.

6.3.4.2 QOM-SSCM practices-performance link

Context dependent factors are crucial in terms of explaining the different outcomes obtained by different firms from the implementation of the "best practice" (Sila, 2007; Sousa and Voss, 2008; Peng et al., 2011). In this regard, QOM is expected to affect the performance outcomes of SSCM practices. According to McGuire (1990), the QOM in an organisation determines not only the way employees, customers and suppliers are treated, but also has a significant impact on the performance of business entities.

The SEM results in figure 5.6 indicates that the path from QOM to SSCM practices and the path from SSCM practices to business performance are statistically significant, while the path between QOM and business performance is insignificant, suggesting an indirect relationship between QOM and business performance. Similarly, the mediation test conducted reveals the mediating effect of SSCM practices in the QOM-performance link. The results show that QOM, when mediated through SSCM practices, lead to greater performance outcomes. This finding therefore provides evidence that QOM influence the implementation of sustainability practices, which in turn, improves the overall performance of firms. These results are supported by Peters and Waterman

(1982) who observed that organisations with sustained performance have an excellent reputation for effective management.

The implication of this finding is that internal support and commitment of top managers are required in order to successfully undertake sustainable practices and achieve the desired outcomes in today's business environment.

6.4 Conclusion

This chapter reported the detailed discussion of the research questions as well as the data analysis techniques employed to answer each research question. The next chapter is chapter 7, which reports the conclusion, theoretical and managerial implications of the study and recommendations for future research.

Chapter 7: Conclusion and recommendations

7.1 Introduction

This chapter highlights the major contributions of the current study, clarifies the core managerial implications stemming from the findings of the research, outlines the limitations of the study, and provides suggestions for further research opportunities.

7.2 Overview of the Research

This empirical research investigated the influence of organisational factors (corporate culture, business size, and QOM) on the implementation of sustainability practices in the oil and gas supply chain. Secondly, the research examined whether the implementation of sustainability practices contributes to business performance. Lastly, the study investigated the extent to which organisational factors interact with the performance outcomes of SSCM practices. This research is made up of two themes; the first determines the impact of organisational factors on SSCM practices in the context of the DCV and RBV, which provide a robust perspective on how a firm's capabilities and resources can enable the adoption of sustainability practices. The second theme empirically establishes the effects of sustainability practices on performance based on the position of the PBV, which holds that practices might account for variations in performance between companies.

In doing so, a survey design was adopted to carry out the study and gain novel insights on the themes of the research. A questionnaire survey, which is a deductive technique of enquiry, was considered suitable for the study. Consequently, data was collected to test the relationships amongst the theoretical constructs and answer the questions of the research. The following sub-sections reflects on the questions and objectives of the study and how they were answered and achieved respectively.

7.2.1 Research Objectives Revisited

Five objectives were formulated in order to achieve the purpose of the study:

RO1: To identify the effects of organisational culture, size, and QOM on SSCM implementation.

RO2: To examine the effects of organisational culture and QOM on firm performance.

RO3: To explore the relationships between SSCM implementation and firm performance.

RO4: To assess the degree to which organisational factors influence the performance outcomes derivable from SSCM implementation.

RO5: To empirically examine and conceptualise an internally driven sustainability practices-performance framework.

The objectives were comprehensively conducted in the process of the study, enabling the researcher to answer the proposed questions. In order to achieve the specified objectives, an extensive review of relevant literature on SSCM was carried out. More so, the extant literature on enablers of SSCM was reviewed, highlighting the internal enablers of SSCM (RO1). A review of existing studies on firm-level factors and performance was equally conducted (RO2). The key constructs of the study were reviewed and the theoretical links amongst organisational factors, sustainability practices and firm performance were examined and clarified (RO3 and RO4). These four objectives (RO1-RO4) guided the current study to realise the last objective of the research, which is to conceptualise a sustainability enablers-practices- performance framework in the O&G industry (RO5). Lastly, the hypothesised associations in the research framework were assessed using three main techniques including correlation analysis, regression analysis and SEM, and findings from these analyses were interpreted and presented.

7.2.2 Answers to the Research Questions

In light of the foregoing discussion, the formulated objectives were framed into four research questions:

RQ1: What are the effects of corporate culture, business size, and QOM on the implementation of SSCM practices?

RQ2: What are the effects of organisational culture and QOM on firm performance?

RQ3: What effect does the implementation of sustainability practices have on firm performance?

RQ4: Does SSCM practices mediate the relationship between organisational factors (culture and QOM) and firm performance?

In this study, attempts have been made to answer the questions of the research. The findings from this study have successfully answered these questions. The framework effectively established the relationships among the five constructs of the study (corporate culture, organisational size, QOM, sustainability practices, and business performance), which has rarely been investigated simultaneously in previous studies (Zhu et al., 2012; Lee et al., 2012; Wan Ahmed et al., 2016; Hong et al., 2022). Therefore, this study offers an important contribution to the SSCM field by examining these five constructs concurrently and developing a framework that considers quantifiable firm characteristics and their effect on organisational performance.

7.3 Major Findings

Generally, this research has found that there is a positive connection amongst internal organisational factors (corporate culture, business size, and QOM) and the implementation of sustainability practices in the oil and gas sector. The findings obtained implies the significance of having the necessary resources and internal competences that will enable the adoption of sustainable practices in order to effectively address environmental and social concerns. The major findings observed include the following:

- Firstly, our findings show that firms are more likely to implement SSCM practices when they are embedded with a strong organisational culture (widely shared) that encourages sustainable behaviour like open communication, supportiveness, innovation and risk-taking. Since the objectives and goals of a company exerts strong influence in shaping workers' individual and collective understanding of the visions and targets of the company, nurturing a sustainability-oriented organisational culture can facilitate the achievement of a more sustainable production management in the oil and gas sector. This is consistent with Tsai et al. (2021) and Hong et al. (2022).

- Secondly, a significant positive relationship was found between business size and the implementation of sustainability initiatives. The findings reveal that the greater human and material resources of bigger firms make them to be more capable of implementing proactive SSCM practices than SMEs. Bigger firms often possess sufficient monetary resources to not only confront the problem of additional expenses resulting from SSCM implementation, but also collaborate with their supply chain partners to achieve sustainability goals. Bigger firms also have much wider global spread with their supply chain partners spanning across multiple countries. This makes the integration of supply chain activities among all partners to be very essential, leading to the implementation of SSCM. Nevertheless, the limited resources of SMEs are generally considered as the main distinguishing factor between SSCM adoption in big companies and SMEs.
- Thirdly, an interesting finding that further attests to the important role of internal capabilities and competences in integrating sustainability practices across the oil and gas supply chain relates to the link between QOM and SSCM implementation. QOM was found to be positively associated with sustainable practices. Specifically, sustainability-related training and management commitment are related to all the dimensions of SSCM. This mean that SSCM strategies are enforced by the top management who also ensure the success of such initiatives through providing effective sustainability-related training across different hierarchies of the organisation. In addition, the strongest correlation was recorded between general level of education and sustainable distribution, indicating that the higher the knowledge accumulation in an organisation, the greater likelihood that sustainable behaviour may develop.
- The findings show that strong corporate culture recorded a positive correlation with all the four categories of business performance. Further analysis reveals that 16.2% of variance in business performance is explained by “organisational culture”. The performance benefits of having a strong corporate culture comes from multiple implications of having strongly held and widely shared norms and values: greater control and harmonisation in the company, orientation towards mutual organisational objectives by workforce and shareholders, and enhanced workforce motivation.
- QOM was found to be significantly related to the four categories of business performance, with the strongest correlation coefficient on economic performance, followed by

operational performance. Further analysis shows that 18.1% of variance in organisational performance is determined by "QOM". The results indicate that QOM is a vital factor that contributes to performance. When an effective support from top managers and relevant training are made available for employees, firms can achieve improved productivity and performance.

- The implementation of SSCM practices was found to be significantly linked to the four performance outcomes. The most important finding from the correlation analysis indicates that sustainability practices have a statistically significant association with "financial performance". Furthermore, it was found that 26.4% of variance in organisational performance is determined by "sustainability practices". This mean that firms can achieve economic, social and environmental performance simultaneously through the implementation of sustainable practices across their supply chains.
- Lastly, the mediation test reveals that organisational culture and QOM, when mediated through SSCM practices, lead to greater performance outcomes. This means that the difference in performance achieved by firms implementing the same sustainable practices can be explained by the strength of culture and QOM in organisations.

7.4 Original contribution from this study

This research was driven by the shortage of empirical studies on SSCM in the O&G sector. Majority of the studies on sustainable practices in the industry are simply focusing on the external pressures and regulations that force firms to implement such practices, often neglecting complex organisational factors that define the way SSCM is implemented in firms, and the profits derivable from the implementation. Concerning the effects of sustainability practices on firm performance, extant literature has failed to reach a comprehensive conclusion that can be used practically to justify its worthiness because both positive and negative effects were realised from the adoption of sustainability initiatives, as reported in existing studies. This study attempts to close these gaps and therefore makes a number of empirical and theoretical contributions, as highlighted in the next sections.

7.4.1 Empirical contributions

The first contribution of this study is that it offers empirical evidence of the key internal enablers of SSCM implementation in the petroleum industry context. Although a number of studies (Wan Ahmed et al., 2016; Wan Ahmed et al., 2017; Gardas et al., 2019; Beiranvand and Dorniani, 2022; Olugu et al., 2022) provide evidence that various factors influence whether companies will implement SSCM practices, majority of these works concentrated on the external factors, often neglecting firm-level factors that can either facilitate or impede development towards attaining a sustainable supply chain. Our research contributes towards filling the gap by exploring the influence of corporate culture, firm size and QOM on the adoption of SSCM practices. More importantly, this study will break new grounds by introducing the concept of QOM to the sustainability discourse, as this is the first study investigating the relationships between QOM and sustainable practices in the literature.

The second contribution of our research is that it clarifies the effects of corporate culture and QOM on the performance of firms. Even though some empirical and non-empirical works have explored the influence of corporate culture in promoting or impeding performance outcomes, this study builds on the existing literature and adds value by pinpointing the characteristics of culture that can enable firms to achieve greater performance. Similarly, this thesis investigates the dimensions of QOM and highlights key aspects that are likely to drive or hinder progress towards maximising organisational performance.

The third contribution of this thesis relates to the effect of SSCM practices on business performance. The notable lack of research empirically investigating the link between sustainable practices and organisational performance in the O&G industry context makes the empirical contribution of our research evident. Although some empirical studies have been conducted in different contexts, the findings reported remain inconclusive because both positive and negative outcomes were observed.

7.4.2 Theoretical contributions

This research adds value to the operations and SCM literature in the following ways. Firstly, it helps in addressing the issue of lack of agreement on the link between SSCM and firm performance by carrying out extensive empirical examination and reporting conclusive findings, which is

consistent with recent studies. Secondly, this study contributes to the DCV, the RBV and the PBV theories of organisations. Specifically, it offers insights on organisational theories that explain firms' adoption of SSCM practices. More importantly, this thesis provides a possibility to integrate the PBV and the RBV as it confirms the direct effect of publicly available practices on performance on the one hand and acknowledges the roles of unique elements and capabilities in the practice-performance link on the other.

7.5 Managerial implications

The results from this research offer some managerial implications that can be applied in practice. These managerial implications include the following:

- The framework proposed can be used by oil and gas corporations to examine their internal environment and identify the organisational factors that can foster or hinder their supply chain sustainability. For example, organisational capabilities and resources are likely to facilitate or hamper development towards attaining a sustainable supply chain.
- The findings provide guidelines for practitioners to use in understanding and identifying the specific aspects of their organisational culture that is affecting their SSCM drive. This can help them to develop the characteristics of culture required in order to effectively implement SSCM and achieve its full benefits.
- Identifying the fundamental sustainability strategy needed to effectively undertake sustainability initiatives will enable managers to increase their understanding of the variety of practices, which are publicly available. Perhaps, this can guide organisations in making decisions about the aspects of SSCM that requires improvements in order improve organisational performance.
- The performance of an organisation is determined by the extent to which its cultural values are widely shared (strong). Consequently, firms must strive towards strengthening their culture through ensuring that organisational values and norms are strongly held and widely shared among its members in order to achieve improved productivity and performance.

- Overall, managers must utilise their full potentials in developing the necessary capabilities required to transform their organisations and adapt to the rapidly changing business environment, in order to achieve superior performance.

7.6 Limitations of the study

In every research, there must be a number of limitations that open up some future research opportunities. This study is not an exception, as it provides further research avenues. Firstly, the study surveyed O&G companies from the United Kingdom and Nigeria only due to lack of access to firms in other countries. Secondly, the conceptual framework development mainly focuses on companies operating in the O&G industry without taking into account manufacturing firms in other industrial sectors. The theoretical model of this study could be adapted to examine other types of companies operating in a different context. Thirdly, this study examined only three key internal factors that motivate firms to implement SSCM practices. Other possible determinants of SSCM that have not been well studied (whether internally or externally) may exist, such as market orientation and firm position in the supply chain. It would be beneficial to develop a more comprehensive model comprising internal and external factors and replicate the study. Fourth, data collected was mainly from top management personnel (supply chain managers), which presents the possibility of bias in responses. Nevertheless, without direct observation of the phenomenon, the potential biases (if any) cannot be proven.

7.7 Recommendations for practitioners and researchers

In a nutshell, the findings obtained from this research offer novel insights on the factors responsible for stimulating and encouraging the adoption of SSCM by O&G companies, and the factors that determine the degree to which performance outcomes are realised from SSCM implementation. Certainly, this can assist policy makers and practitioners to make appropriate decisions of SSCM strategies to implement and augment their organisational processes to achieve the expected benefits of integrating SSCM across supply chains. In order to motivate companies towards

adopting SSCM as well as provide opportunities for future research, the following recommendations were derived from the findings of this study:

- Governments and regulatory agencies can encourage companies to implement SSCM practices by increasing incentives for firms' environmental performance either through tax reductions or subsidies. This will help towards balancing environmental protection and financial performance, offering 'win-win' benefits for all parties.
- Financial assistance is required from governments to support SME's, which are generally discouraged by the financial burden of SSCM initiatives, despite showing interest in adopting SSCM to minimise their negative environmental impacts.
- Practitioners across multiple industries should consistently share their success stories of SSCM implementations and state the precise performance outcomes achieved through incorporating such initiatives across their supply chains in order to inspire other potential adopters. This will help to reduce the doubts about whether it really pays to go green and lessen the financial risks related to SSCM implementation.
- Sustainability-related trainings and seminars on enlightening and enhancing the environmental knowledge of organisational members should be prioritised to improve the overall sustainability performance of the organisation.
- Given the significant roles of corporate culture, organisational size, and QOM in the implementation of sustainability practices, it is essential to conduct a more comprehensive examination of these factors. For example, future researchers should carry out comparative studies across different industry contexts to assess the effect of industry-related parameters on the adoption of SSCM and the benefits derivable from its implementation.
- The current study focused on only three key internal factors that drive firms' adoption of SSCM and therefore, other possible determinants of SSCM that have not been well studied may exist. Future researchers should investigate the role market orientation and firm's position in the supply chain play in SSCM implementation and further examine other potential determinants.
- Since the research model was tested in the O&G industry, future researchers should explore the applicability of the proposed conceptual model to different industry and compare the new findings with the one obtained from this study. Thus, further investigation is needed, subject to hypothetical justification and the attainment of reliable data.

- Future researchers should conduct a comparative study on the influence of internal and external sustainability practices on business performance, in order to ascertain the extent to which each category of sustainable practices contribute to organisational performance.
- Lastly, a more holistic investigation of QOM is recommended, as there is a dearth of research on the concept. Future researchers should study the role of QOM on other organisational innovations in greater detail and improve on the measurement items used to measure QOM in this study.

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Appendix A

SURVEY OF SUSTAINABLE PRACTICES IN OIL AND GAS INDUSTRY

A. General Information

1. Company name.....

2. Position of the respondent(optional).....

3. When was your company established? (Appropriately).....

4. What is the number of employees in your company?

Less than 50 ☒ 51 – 100 ☐ 101 – 200 ☐ 201 – 300 ☐

301 – 500 ☒ 501 - 1000 ☐ 1001 – 2000 ☐ above 2001 ☐

5. In how many countries does your company operate?

Less than 15	16 – 30	31 – 45	46 - 60	61 and above
☐	☐	☐	☐	☐

6. What is the annual sales turnover of your company?

	Tick
Less than £5 million	
£6m - £10m	
£11m - £20m	
£21m - £50m	
Above £100m	

7. What is the operational scope of your company?

Operational scope	Tick
Multinational with headquarters outside UK	
Multinational with headquarters in UK	
National with all operations in UK	
Small and medium enterprise (SMEs)	

8. What is your company's major line of products/services? Please tick all that apply

Types of operations	Tick
Oil and gas service provider	
Oil and gas logistics & transport	
Exploration and production	

Marketing and distribution	
Refining	
Consultancy	
Retailing e.g. gas stations	
Marine engineering and construction	
Others, please specify…….	

B. Sustainable supply chain management practices

9. For how long has your company implemented sustainability practices? Please tick (✓)

Less than **5 years**	**6 – 10 years**	**11 – 15 years**	**16 - 20 years**	**Above 21 years**
☐	☐	☐	☐	☐

10. Does your company consider the following practices over the years? Please tick (✓) all that apply.

Sustainable design	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Eco-labelling of products					
ISO 14001 certification					
Use of environmental management systems					
Cleaner productions					
Design products for recycle					
Design products to avoid use of hazardous materials					
Design products for reduced consumption of energy					

11. Does your company consider the following practices over the years? Please tick (✓) all that apply.

Sustainable procurement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
We select suppliers based on their social and environmental skills					
We select suppliers based on their ability to support our social and environmental objectives					
We select suppliers based on their ability to create environmentally friendly products					
Environmental audit for supplier's internal management					
Providing design specification to suppliers that include environmental requirements for purchased items					

12. Does your company consider the following practices during the years? Please tick (✓) all that apply.

Investment recovery	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Sale of excess inventories or materials					
Sale of excess capital equipment					
Sale of scraps					
Sale of used materials or by-products					

13. Does your company consider the following practices over the years? Please tick (✓) all that apply.

Sustainable distribution	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Cooperation with customers for using less energy during product transportation					
Use of renewable energy in the process of products packaging					
Use of renewable energy in any mode of products transportation					
Cooperation with suppliers to reduce emissions during product transportation					
Cooperation with suppliers to improve their waste reduction during product packaging					

14. Does your company show commitment to the following practices during the past years? Tick (✓) all that apply.

Social practices	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Community investment					
Protecting human rights					
Health and safety training for employees					
Sustainable working condition for employees					
Employee skills development					

C. Organisational factors

15. Rate the extent to which the following factors affect the implementation of SSCM practices in your organisation.

Business size	Very Low	Low	Moderate	High	Very High
Number of trained employees					
Annual turnover					
International reach					
The number of office locations and service centres etc.					

16. To what extent can your company be described by the following terms? Please tick (✓) all that apply.

Organisational culture	Very Low	Low	Moderate	High	Very High
Team-oriented					
People-oriented					
Supportive					
Cohesive					
Innovative					
Flexible					
Visionary					
Risk-taker					
Structured					
Predictable					
Stable					
Formalized					
Results-oriented					
Opportunistic					
Competitive					
Goal-achiever					

17. With regard to the following factors, please describe your company by ticking the appropriate boxes provided.

Quality of management	Very Low	Low	Moderate	High	Very High
Discipline					
Experts in management team					
Top management commitment to improvements					
General level of education					
Sustainability-related training					

D. Organizational performance

18. To what extent has your company achieved each of the following during the past years? Please tick(✓).

Environmental measures	Very low	Low	Moderate	High	Very High
Reduction of wastewater					
Carbon footprint reduction					
Reduction of air pollution					
Reduction of energy used					
Reduction of water used					
Reduction of solid waste					
Decrease in use of hazardous materials					

19. To what extent has your company achieved each of the following during the past years? Please tick(✓).

Economic measures	Very Low	Low	Moderate	High	Very High
Net profit					
Return on sales					

Return on investment					
Improvement in firm's image					
Market shares					
Decrease in cost of materials purchased					

20. To what extent has your company achieved each of the following during the past years? Please tick (✓).

Social measures	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
Improvement in employee health and safety					
Improved stakeholder welfare					
Community investment					
Reduction in environmental impact to the public					
Improvement in community health and safety					

21. To what extent has your company achieved each of the following during the past years?

Operational measures	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
Proactivity					
Innovation					
Flexibility					
Speed					
Low costs					
Quality of products/services					

22. Please provide below any additional information about your company that you believe is not covered by any of the above and may be useful to this survey.

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If you are interested in receiving a summary of the findings of the research, please tick this box ☐

****** END ******

Thanking you so much for your time and support.