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SUPPLY CHAIN MANAGEMENT AND ITS IMPACT ON OIL AND GAS PRODUCTION. A CASE STUDY OF OIL AND GAS FIRMS IN GHANA.

By

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DECLARATION

I hereby declare that this submission is my own work towards the MSC Procurement and Supply Chain Management, to the best of my knowledge and belief, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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DEDICATION

This work is dedicated to my family and beloved friends.

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ABSTRACT

The Oil and Gas firms in Ghana are faced with operational challenges in most of their supply chain activities. The study assesses SCM's impact on operational performance in Ghana's oil and gas sector through three objectives. It explores the influence of SCM on efficiency and cost reduction, investigates TQM's relationship with efficiency and customer satisfaction, and explores TQM's moderating role in the SCM-operational performance link. A descriptive design and cross-sectional survey are employed, guided by positivism. Purposive sampling of 160 participants is justified, and data collection utilizes a Likert-scale questionnaire. The focus on managerial roles aligns with their supply chain expertise within 15 chosen companies. Quantitative approach was used for collecting data and analyzing data. The study adopted Statistical Package for the Social Sciences (SPSS) and Andrew-Hayes Process Macro module to conduct regression, reliability, correlation, descriptive and moderation analysis. The study found out that supply chain management (SCM) has a positive and significant influence on firm performance. Total quality management (TQM) positively affects firm performance. Total quality management does not moderate the supply chain management and firm performance. It is recommended that organizations and managers should focus on integrating robust supply chain management practices and total quality management principles to enhance firm performance, leveraging the positive impacts of both strategies.

TABLE CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

One of the most essential raw commodities in the world is petroleum, which includes gas as well. Since the middle of the 1950s, it has been the most important source of energy on the globe (Lisitsa et al., 2019; Huslig, 2014; and Mesfin, 2019). The oil and gas industry are not only one of the most important aspects of the global economy, but they also have a considerable influence on the growth of a variety of other business sectors. This form of energy is employed in a variety of contexts, including but not limited to: the operation of automobiles; the provision of electricity for the heating of homes and water; the practise of modern medicine; the extraction of chemicals for use in cleaning products for the home; and so on (Dhillon and Kaur, 2015). The industries of petroleum and natural gas are extremely important to the functioning of the world economy. (Akampumuza et al., 2017) says that many other important industries, such as the auto industry and the manufacturing industry, depend on the goods made by this industry.

In addition, supply chain management, sometimes known as SCM, refers to the process of planning and managing the flow of goods, information, and money within a supply chain (Emmett and Crocker, 2016). It entails the coordination and administration of all of the processes that are involved in a supply chain. SCM may give the impression of being overly straightforward, but in reality, it is a difficult idea to implement in a business setting because of the nature of the decisions it requires and how far-reaching they are. In addition, the supply chain is the network of all organisations that are involved in the process of making and distributing a finished product to the ultimate consumer (Abeyratne and Monfared, 2016). This includes sourcing the raw materials and components, creating, manufacturing, and

assembling the products; packaging and labelling said products; storing said products in warehouses; entering orders and keeping track of said orders; distributing said products; and delivering said products to the ultimate consumer (Sanders, 2020).

During the process of the supply chain, natural resources and/or raw materials are obtained and then turned into a finished product, which is then shipped out to the client (Papapostolou, 2011). In the gas and oil sector, crude oil is sent by the suppliers to the manufacturers so that it can be refined at the manufacturers' facilities (Seelke et al., 2014). The crude oils are refined in order to produce the desired end product. After that, the products are sent to different retail centres where they are put on shelves with gasoline, engine oil, and other goods.

The competitiveness of organisations is impacted by shifts in technology, markets, and the requirements of customers, which necessitates the ongoing restructuring of positioning strategy and tactics in the oil industry (Ismail et al., 2017; Turnheim and Geels, 2012; and Iles and Martin, 2013). At the moment, the most significant challenge that the oil sector must overcome is lowering the cost of manufacturing and ensuring a steady supply of finished goods to customers. Increasing the effectiveness and competitiveness of a petrochemical plant and its supply as a whole can be accomplished through the use of efficient supply chain management. In a supply chain, a company is linked to its upstream suppliers and its downstream distributors. This connection exists because of the flow of materials, information, and capital via the supply chain (Carter et al., 2015). Consequently, the objective of this research is to explore the influence that supply-chain management has on the production of oil and gas.

1.2 Statement of the Problem

The issue of supply chain management is one that receives a lot of attention, particularly in the oil and gas industry. This is due to the fact that, despite the significance of supply chain management and the increasing complexity of the field, the oil and gas industry is still in the process of figuring out how to manage their supply chains effectively (Ghadge et al., 2020; Gouda and Saranga, 2018). In recent years, both academic scholars and business professionals have focused a significant amount of attention on supply chain management (Silvestre, 2015; Jain, S.; Jain and Metri, 2018; Ahmad et al., 2017). Therefore, there is a significant body of published work that addresses this issue. In light of this, Joshi et al. (2017) wrote in their article titled "Supply Chain Innovations in the Oil and Gas Industry" that supply chain innovations in the oil and gas industry are still an area of concern of the highest priority. This is because of the environmental, socioeconomical, and political effects that this has on the population of the entire world.

Furthermore, empirically, several research studies have examined the role of SCM in the oil and gas industry (Gardas et al., 2019; Joshi et al., 2017; and Gardas et al., 2019), and they have obtained findings that are not that detailed due to the fact that the majority of their findings were directed toward the sustainability aspects of the operations of the oil and gas business. (Gardas et al., 2019; Joshi et al., 2017; and Gardas et al., 2018). According to Rentizelas et al. (2020), these contradictory findings may be the result of several empirical and theoretical flaws in this study. This may be the case because a significant amount of effort is not directed toward understanding the operational effects of the total segments of the supply chain in oil and gas production and their relationship with the performance of the oil and gas industry. The upstream, midstream, and downstream sectors of the oil and gas business were empirically defined by Joshi et al. (2017). Similarly, the petroleum industry in

Ghana is separated into these three distinct sectors: the upstream, midstream, and downstream sectors (Amponsah and Opei, 2014).

In addition, Florescu et al. (2019) determined that the functions of SCM are as follows: planning, execution, coordination, and collaboration. There is a deficiency in the empirical evidence about research that are utilised to analyse the direct impact of the managerial functions and the oil and gas supply chain segments. This deficiency has resulted in a gap in the existing body of research. In addition, the vast majority of empirical research has been conducted in developed countries, despite the fact that developing countries like Ghana have experienced significant economic growth ever since the petroleum industry made the discovery that oil could be extracted in commercial quantities from the Jubilee fields in 2007. This study aims to fill in this gap by looking into the relationship between SCM functions, the Oil & Gas supply chain segment, and firm performance.

1.3 Objectives of the Study

The main objective of the study is to analyse the effect of SCM on operational performance of oil and gas firms in Ghana. The study specifically addressed the following objectives:

1. To examine the effect of supply chain management on operational performance.
2. To analyse the effect of Total quality management practice on operational performance.
3. To investigate the moderation role of total quality management practice of supply chain management and operational.

1.4 Research Questions

1. What is the effect of supply chain management on operational performance?
2. What is the effect of Total quality management practice on operational performance?

3. What is the moderation role of total quality management practice of supply chain management and operational?

1.5 Significance of the Study

Companies, notably those in the oil and gas industry, as well as the government and academics, were helped by the study in their efforts to understand the influence that SCM has on oil and gas production as well as the impact that it has on firm performance. Because of this, the study has effects on management, public policy, academics, and theoretical discussion.

This study provides management with the understanding necessary to design strategies that so far have Supplier Selection, Product Stewardship, and Logistics Management on four SCM functions, and Planning, Execution, Coordination, and Collaboration are concerned. This understanding enables management to design strategies that so far have supplier selection, product stewardship, and logistics management.

The findings of the study informed the government on the SCM functions of companies operating in the oil and gas industry. This will help shape policy by showing how SCM functions can work together to help oil and gas companies improve and boost the performance of their operations so that they can lower their costs of production while making the most money possible.

In conclusion, the research added new information to the existing body of knowledge about how oil and gas companies in Ghana, a developing region, might make use of top management commitment to influence the relationship between supply chain management and firm performance. In addition, the research was useful as a reference for other individuals who could be interested in conducting research that is connected to the variables that were used in the study.

1.6 Scope of the Study

Considerable studies have been conducted on supply chain management in oil and gas industry. However, limited studies, particularly from the Sub-Saharan particularly Ghanaian contexts, have explored the relationship between SCM functions, the Oil & Gas supply chain segment, and firm performance. Geographically, the study was carried out in Accra on Modec Production Services Ghana JV Ltd. The supply chain management function is based on planning, execution, coordination, and collaboration) and the O & G supply chain segments (upstream, midstream, and downstream). The study also focuses on one method of research findings rather than a mixed methodology.

1.7 Summary of Methodology

The term "research methods" refers to the entire process of conducting research, beginning with the formulation of research questions and continuing through the processes of sampling, measurement surveys, scaling, research design (both experimental and quasi-experimental), data analysis, and the writing of the research paper. The inductive methodology was selected for the research project; consequently, a hypothesis was developed and validated through the application of already established theoretical frameworks in order to arrive at the results of the study. In addition, descriptive research designs were utilised throughout the course of the study. In order to get quantitative replies, the questionnaire method of data collection will be used in the descriptive research. Additionally, opinions from supply and logistics staff at Modec Production Services Ghana JV Ltd. will be gathered for the study as part of the research process. In order to obtain information on the subject of the research, the survey method and the convenience sampling approach will be employed in the investigation, and SPSS version 23 will be utilised for the analysis of the data. Specifically, descriptive statistics

such as means and frequencies were used to characterise the quality of the data as well as to offer quantitative descriptions in simplified summaries. These statistics were utilised in this manner because of the dual purpose that they serve. Also, regression analysis was used to find out how strong the statistical link was between the variables based on the research hypothesis and to come up with the results of the study.

1.8 Limitations of the Study

This research study may be limited in the smaller number of institutions that data will be sampled from. This study only envisages to organize data from staff of Modec Production Services Ghana JV Ltd. The study is also limited because other jurisdictions are not involved.

1.9 Organisation of the Study

The study is made up of five chapters: In the first chapter, there is an introduction that details the history of the study; the problem statement; the overall aims of the investigation; and the specific objectives of the study. In addition to this, it discussed the research questions, the significance of the study, the scope of the study, and the organisation of the research. In the second chapter, a review of the relevant literature was presented. The methods will be presented in Chapter Three. The research design, the population that will be the focus of the study, the sample size and frame, the sampling techniques, the data collection instrument, and the statistical tools that will be used to analyse the data are all outlined in detail in this chapter. The findings and subsequent discussion are presented in Chapter Four. It outlines the data gathered from the field and provides a table-based summary of the information. In this chapter, we also reviewed the conclusions of the study in comparison to the previous empirical research. In the fifth chapter, both the conclusion and the recommendation are

presented. This chapter gives a brief summary of the most important research findings and conclusions, as well as recommendations that make sense based on those findings.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents the literature review for the study Supply Chain Management and its Impact on Oil and Gas Production. This chapter breaks down into conceptual literature review, theoretical literature review, empirical literature review, and hypothesis formulation, as well as the conceptual framework. The conceptual literature review examines supply chain management, operational performance, and total quality management practices. The theoretical literature review looked at the resource-based view and the dynamic capabilities view.

2.1 Conceptual Literature Review

2.1.1Supply Chain Management

According to Thoo et al. (2017), supply chain management (SCM) is a strategic methodology that involves the management of the flow of goods and services from the initial stage of raw material acquisition to the final stage of delivery to the end customer. The process encompasses the oversight of the acquisition of primary resources, the manufacturing and integration of commodities, the warehousing and dispersal of finalized items, and the transportation to the ultimate consumer (Nuzulita, Djohan, and Roiqoh, 2020). Supply chain management (SCM) is an essential element of organizational operations, given its significant influence on the enterprise's capacity to satisfy customer needs, control expenses, and sustain a competitive edge in the industry (Christopher, 2016). According to Fawcett et al. (2011), a notable development in supply chain management (SCM) is the growing reliance on technology as a means of enhancing operational effectiveness and gaining a competitive edge. Organizations are allocating resources towards technological advancements such as

cloud computing, big data, and artificial intelligence with the aim of optimizing their supply chain operations and minimizing expenses. According to a study conducted by the MIT Center for Transportation and Logistics in 2015, organizations that employ technology to enhance their supply chain operations experience reduced inventory expenses and expedited delivery schedules in contrast to those that do not.

In addition, it is imperative to note that risk management plays a pivotal role in supply chain management (SCM), since any disruptions in the supply chain can potentially have substantial repercussions on the company's financial performance and operations. Presently, corporations are implementing risk management tactics to recognize and alleviate plausible supply chain hazards. The aforementioned strategies involve the creation of backup plans, the exploration of alternative suppliers, and the allocation of resources towards insurance and other risk-mitigation instruments, as suggested by Yoon et al. (2018) and Coelho Albertin (2017). Contemporary business practices involve enhanced collaboration between companies and their suppliers, customers, and other stakeholders to optimize supply chain processes and enhance overall efficiency. This is evidenced by the works of Marchi and Zanoni (2017) and Mastos et al. (2020). This encompasses the act of exchanging information, collaborating to address problems, and collectively creating remedies for supply chain complexities.

Furthermore, supply chain management (SCM) within the oil and gas sector is distinguished by intricate, high-cost, and worldwide activities, as noted by Gupta et al. (2020). The oil and gas industry involves a range of processes, such as exploration, production, transportation, refining, and distribution, as noted by Yusuf et al. (2013). The various stages encompass a multitude of stakeholders, such as suppliers, contractors, regulators, and customers, as noted by Stevens et al. (2015). According to Al-Kaabi et al. (2020), the implementation of efficient

supply chain management (SCM) strategies can aid oil and gas companies in resource optimization, improved collaboration, risk mitigation, and profit maximization. Strategic sourcing refers to the process of identifying, evaluating, and selecting suppliers that can provide goods and services that meet an organization's needs. This approach involves analyzing the market, negotiating contracts, and managing supplier relationships to optimize value and minimize risk. The selection of suppliers who offer cost-effective, reliable, and high-quality products and services is a crucial component of supply chain management, commonly referred to as strategic sourcing (Abdulrahman et al., 2015). According to Kumar et al. (2020), strategic sourcing is becoming a more prevalent practice among oil and gas companies as a means of effectively managing their supplier base, engaging in contract negotiations, and monitoring supplier performance.

The management of inventory in the oil and gas sector pertains to the maintenance of optimal stock levels, encompassing drilling equipment, refined products, and spare parts (De Vries & De Koster, 2018). Alkathiri et al. (2021) assert that proficient inventory management is imperative in order to curtail expenses, mitigate instances of depleted stock, and guarantee the punctual provision of commodities and amenities. The efficient movement of materials, products, and information throughout the supply chain is reliant upon logistics and transportation (Papadopoulou et al., 2017). According to Nikolova et al. (2020), the implementation of effective logistics and transportation systems can lead to the mitigation of disruptions, decreased transportation expenses, and improved customer satisfaction.

The oil and gas sector is vulnerable to geopolitical hazards, including political instability, alterations in regulations, and limitations on trade, which can cause disturbances in supply chains and hinder operations (Tukamuhabwa et al., 2015). The industry is increasingly

confronted with the imperative to reduce its environmental impact and attend to social issues, including community engagement and human rights (Boutaleb et al., 2020). The aforementioned issues may require alterations in the supply chain, such as the implementation of more environmentally friendly technologies and the establishment of communication with nearby communities (Choudhary et al., 2019). The supply chain of the oil and gas industry is marked by a considerable degree of complexity, which can be attributed to various factors, including but not limited to lengthy lead times, projects that require significant capital investment, and a dependence on specialized equipment (Bello et al., 2016). According to Yan et al. (2018), the complex nature of supply chain operations can make it challenging to manage and optimize them.

2.1.2 Operational performance

According to Omotayo (2015), "operational performance" refers to the degree of efficiency with which an organization functions in order to attain its intended aims and objectives. The definition in question incorporates a broad spectrum of variables, including but not limited to efficacy, output, excellence, and client contentment. The assessment of operational performance is a multifaceted undertaking that necessitates the examination of numerous metrics and the amalgamation of data from diverse sources (Maestrini et al., 2017). The Balanced Scorecard (BSC), a performance measurement tool developed by Kaplan and Norton in the 1990s, is a highly utilized metric for evaluating operational performance. According to Mehralian, Nazari, and Ghasemzadeh (2018), the Balanced Scorecard (BSC) is a tool utilized for performance management that offers a holistic outlook of an organization's performance by taking into account four perspectives, namely financial, customer, internal processes, and learning and growth. The utilization of alternative metrics for evaluating operational performance has garnered increasing attention. These metrics include the

European Foundation for Quality Management (EFQM) Excellence Model, the Malcolm Baldrige National Quality Award (MBNQA) criteria, and the Six Sigma methodology. Relevant literature has explored these metrics, as evidenced by studies conducted by Aydn and Kahraman (2019), Gupta and Vrat (2020), Alanazi (2020), and Fonseca, Amaral, and Oliveira (2021). The aforementioned metrics have demonstrated their efficacy in furnishing significant perspectives on an entity's operational efficiency and can be leveraged to pinpoint domains that necessitate enhancement.

The enhancement of operational performance has emerged as a crucial element for achieving business triumph as enterprises endeavor to augment the efficiency and efficacy of their operations. The evaluation of performance is a crucial component of operational performance, as it enables organizations to assess their efficacy and productivity. According to Neely et al. (2010), it is imperative for organizations to define unambiguous performance metrics to steer and evaluate their operations. Neely et al. (2010) have identified several frameworks for performance measurement, including the balanced scorecard and the performance prism. These frameworks enable organizations to assess their performance from various perspectives.

The significance of aligning performance metrics with an organization's strategic objectives is highlighted by Bititci et al. (2012), as it guarantees that operational performance is geared towards accomplishing enduring triumph. Bourne and Bourne (2011) assert that performance measurement systems that are effective should possess the ability to be flexible, thereby enabling organizations to modify their metrics in response to changes in their objectives. In recent times, supply chain management (SCM) has become a pivotal component of operational efficiency. According to Christopher and Holweg's (2011) perspective, the

implementation of efficient supply chain management (SCM) practices can lead to cost reduction, enhanced customer service, and improved overall organizational performance. The significance of incorporating information systems, logistics, and procurement in the quest for a productive and proficient supply chain is emphasized.

The authors, Gunasekaran and Ngai (2012), underscore the significance of technology in contemporary supply chain management (SCM), underscoring the growing significance of information exchange and instantaneous data analysis in propelling operational efficacy. Gunasekaran and Ngai (2012) have identified several crucial technologies, including RFID, IoT, and blockchain, that play a vital role in facilitating efficient and effective supply chain management. Furthermore, according to Richey et al. (2010), the implementation of sustainable supply chain management practices has the potential to enhance operational efficiency as well as foster ecological and societal accountability.

Furthermore, the utilization of lean management principles across diverse industries has been extensively examined within the framework of operational performance. According to Womack and Jones (2010), lean management is a framework that prioritizes waste reduction, process improvement, and enhanced efficiency. According to the authors, the effective integration of lean principles has the potential to yield substantial enhancements in operational performance. In their study, Jasti and Kodali (2015) conducted a comprehensive analysis of lean management practices within the manufacturing industry. Their findings revealed that the implementation of lean principles resulted in notable enhancements in productivity, decreased lead times, and superior quality. Cabral et al. (2012) conducted a study on the implementation of lean management practices in the healthcare industry. The

study highlights the potential benefits of lean methodologies for enhancing operational efficiency and improving patient satisfaction.

2.1.3 Total Quality Management Practice

The philosophy of Total Quality Management (TQM) prioritizes the ongoing enhancement of organizational procedures, goods, and services with the aim of attaining customer contentment and organizational prosperity (Sohel-Uz-Zaman, 2016; Saha, 2016). Total Quality Management (TQM) is founded on a number of fundamental principles, such as prioritizing customer satisfaction, perpetually striving for betterment, and engaging employees in the process. According to Oakland's (2014) perspective, total quality management (TQM) prioritizes the attainment of customer satisfaction as its main objective. To achieve this, organizations must exert effort in comprehending and fulfilling customer requirements and anticipations in a consistent manner. Goetsch and Davis (2014) underscore the significance of perpetual advancement, highlighting that entities ought to strive for the incessant refinement of procedures, commodities, and amenities to attain eminence.

In addition, the involvement of employees is a pivotal component of total quality management (TQM), as it cultivates a perception of possession and accountability among the workforce. According to Sharma and Kodali (2012), the successful implementation of total quality management (TQM) necessitates the active involvement of all personnel, given their direct influence on the caliber of goods and services. The authors propose that organizations ought to foster a culture that emphasizes collaboration, communication, and shared decision-making as a means of facilitating employee participation in Total Quality Management (TQM) initiatives. The implementation of Total Quality Management (TQM) in diverse industries has been extensively researched, with a particular emphasis on the difficulties,

tactics, and outcomes associated with TQM application. In their study, Benavides-Velasco and colleagues (2011) conducted a thorough examination of the implementation of total quality management (TQM) in small and medium-sized enterprises (SMEs). The researchers identified several obstacles that hindered the successful implementation of TQM, including inadequate resources, reluctance to change, and inadequate training. The article suggests various tactics to surmount the aforementioned obstacles, such as securing the involvement of top-level executives, providing instruction to personnel, and amalgamating Total Quality Management (TQM) with other administrative methodologies.

Furthermore, the effect of total quality management (TQM) on the performance of organizations has been extensively examined in various research studies. According to Sadikoglu and Zehir's (2010) research, the implementation of total quality management (TQM) resulted in enhancements in operational performance, financial performance, and customer satisfaction within manufacturing organizations. Talib and colleagues (2011) performed a meta-analysis of total quality management (TQM) studies and determined that TQM practices have a beneficial impact on organizational performance across multiple industries, such as manufacturing, services, and healthcare. The amalgamation of Total Quality Management (TQM) with other managerial methodologies, such as lean management and Six Sigma, has garnered considerable attention in contemporary scholarly discourse. According to Dahlgaard and Dahlgaard-Park (2011), total quality management (TQM) and lean management share a mutual objective of achieving continuous improvement and can be effectively amalgamated to augment operational performance. The authors propose that organizations should embrace a comprehensive approach to quality management that integrates total quality management (TQM), lean management, and other relevant practices to attain superior outcomes. The authors, Antony et al. (2012), investigate the synergistic

interplay between total quality management (TQM) and Six Sigma. They observe that the integration of these two methodologies can result in noteworthy enhancements in operational performance and quality. The authors underscore the necessity of a methodical strategy for the amalgamation of Total Quality Management (TQM) and Six Sigma. This approach guarantees that the principles and practices of both methodologies are harmonized and mutually supportive.

2.2 Theoretical Literature Review

2.2.1 Resource-Based View (RBV)

The Resource-Based View (RBV) theory is a strategic management framework that underscores the significance of a company's resources and capabilities in attaining a competitive edge (Otola, Ostraszewska, and Tylec, 2013). The RBV theory's inception can be attributed to Edith Penrose's seminal book "The Theory of the Growth of the Firm," published in 1959. According to Penrose's argument, the expansion of a company is contingent upon its internal resources and its capacity to effectively utilize them. The concept in question served as the basis for the Resource-Based View (RBV) theory, which emerged subsequently as a reaction to the constraints of the Industrial Organization (IO) economic paradigm in the realm of strategy. The IO approach was primarily concerned with external elements such as industry configuration and rivalry (Porter, 1980).

The Resource-Based View (RBV) theory emerged as a prominent concept during the 1980s and 1990s, primarily due to the contributions of various scholars. One such scholar, Birger Wernerfelt, introduced the term "resource-based view" in his 1984 publication titled "A Resource-Based View of the Firm." According to Wernerfelt, the strategic positioning and performance of a firm are primarily determined by its resources. The Resource-Based View

(RBV) theory has been extensively employed in examining diverse facets of organizational performance, such as supply chain management (SCM), operational performance (OP), and total quality management (TQM) practices. According to Barney's (1991) Resource-Based View (RBV), organizations ought to concentrate on obtaining, enhancing, and utilizing resources that possess the characteristics of being valuable, rare, inimitable, and non-substitutable (VRIN) in order to attain a competitive advantage that can be sustained over time. The aforementioned theory has been extensively implemented across diverse fields such as supply chain management (Ketchen Jr., Hult, & Slater, 2007), operations management (Sirmon, Hitt, & Ireland, 2007), and total quality management practices (Powell, 1995).

The resource-based view (RBV) has been widely employed as a framework for investigating supply chain management (SCM) and its influence on the performance of organizations. Li et al. (2010) contend that a company's competitive edge within the supply chain is derived from its distinct resources and capabilities. The authors propose that companies ought to allocate resources towards the improvement of their supply chain competencies in order to augment their operational effectiveness. Autry and Griffis (2011) underscore the significance of VRIN resources in attaining exceptional SCM performance. The study conducted by Wieland et al. (2016) expanded the resource-based view (RBV) framework to investigate the significance of supply chain integration. The findings of the study revealed that the proficient integration of supply chain partners is a crucial resource that satisfies the criteria of "valuable, rare, inimitable, and non-substitutable (VRIN). The study conducted by Awaysheh et al. (2021) demonstrated that enhanced performance can be attributed to the crucial resources of information sharing and collaboration among supply chain partners. The literature demonstrates the evident relevance of resource-based view (RBV) to both total quality management (TQM) practices and operational performance. According to Prajogo and Sohal

(2013), it is advisable for companies to concentrate on the acquisition and development of their operational resources and capabilities as a means of improving their overall performance. The significance of Total Quality Management (TQM) practices in the development of said resources is explicitly highlighted.

Kaynak and Hartley's (2010) research revealed that Total Quality Management (TQM) practices play a crucial role in enhancing operational performance by facilitating the development of valuable, rare, inimitable, and non-substitutable (VRIN) resources. The results obtained are in line with the recent research conducted by Nguyen et al. (2021) and Al-Zu'bi (2022), which established a favorable correlation between total quality management (TQM) practices, operational performance, and competitive advantage. Resource Management: A Comprehensive Framework for Business Sustainability According to Huang et al. (2012), the presence of supply chain capabilities can aid in the execution of TQM practices, ultimately resulting in enhanced operational performance. Cheng et al. (2019) have shown that the amalgamation of supply chain management (SCM) and total quality management (TQM) practices can lead to a significant improvement in the overall performance of an organization. The study conducted by Zhu and Sarkis (2023) provides evidence that companies that implement robust supply chain management (SCM) and total quality management (TQM) practices, grounded in the resource-based view (RBV) framework, demonstrate enhanced operational performance. The findings of their research suggest that the resource-based view (RBV) offers a significant theoretical framework for comprehending the interrelationship among supply chain management (SCM), operations management (OP), and total quality management (TQM) practices.

2.2.2 Dynamic Capabilities View (DCV)

The Dynamic Capabilities View (DCV) was developed as a means of expanding upon the Resource-Based View (RBV) in order to overcome the constraints of static resources and capabilities in environments that are subject to rapid change (Eisenhardt & Martin, 2000). According to Teece et al. (1997), the possession of dynamic capabilities is essential for organizations to effectively expand, alter, or establish their resource base in order to attain a competitive advantage that can be sustained over time. According to Teece et al. (1997), dynamic capabilities refer to the capacity of a firm to effectively incorporate, construct, and adapt both internal and external competencies in response to swiftly evolving environments. The dynamic capabilities view (DCV) has been extensively utilized in the academic literature on supply chain management (SCM) to examine the manner in which organizations enhance their supply chain performance by developing and utilizing their resources and capabilities. According to Lambert, Cooper, and Pagh (1998), SCM pertains to the amalgamation of crucial business procedures that involve end-users and original suppliers who offer products, services, and information to enhance value for customers and stakeholders. Li et al. (2008) posit that the interplay between supply chain integration and firm performance is significantly influenced by dynamic capabilities.

The ability to sense is a crucial aspect for organizations to recognize and evaluate modifications in the supply chain milieu, such as market inclinations, consumer requisites, and supplier proficiencies (Teece, 2007). Wu, Chiang, and Wu (2014) discovered that the sensing capabilities of a company within the supply chain context have a favorable impact on both the agility of the supply chain and the overall performance of the firm. The ability to sense changes in the supply chain environment is a valuable capability for firms, as it allows them to monitor and assess the situation effectively. This, in turn, enables them to respond proactively to emerging opportunities and threats. According to Teece (2007), the process of

securing capabilities relates to the company's proficiency in effectively seizing and utilizing opportunities within the supply chain. According to Li et al. (2008), the ability of a firm to manage relationships and coordinate activities with its supply chain partners is closely linked to its seizing capabilities. Kristal, Huang, and Roth's (2010) research revealed a positive correlation between a company's seizing capabilities within the supply chain context and both supply chain integration and overall firm performance. The act of seizing capabilities empowers organizations to create and execute inventive resolutions to address supply chain obstacles and enhance the overall performance of the supply chain. Finally, the DCV has been utilized in scholarly literature to examine the correlation between total quality management (TQM) practices, operational performance (OP), and supply chain management (SCM). The philosophy of total quality management (TQM) is centered on the perpetual enhancement of processes, products, and services with the aim of attaining customer satisfaction and organizational performance, as posited by Deming (1986).

2.3 Empirical Literature Review and Hypothesis Formulation

The provided review summarizes several empirical studies that examine the relationship between supply chain management (SCM), total quality management (TQM), and operational performance (OP). The studies explore various aspects of these concepts and their interplay, highlighting how SCM and TQM practices can influence and enhance operational performance in different industries and contexts.

In the study by Truong et al. (2017), the relationship between supply chain management (SCM) practices and operational performance (OP) is investigated within the context of Vietnamese garment enterprises. Employing structural equation modeling, the researchers validate their model and ascertain the substantial impact of SCM practices on operational performance. Notably, the study identifies specific SCM practices, including customer focus

and supplier management, as exerting both direct and indirect influences on OP. The findings underscore the pivotal role of SCM in enhancing operational performance and shed light on the nuanced ways in which distinct SCM practices resonate with and contribute to the overall efficiency and effectiveness of garment enterprises. This research not only emphasizes the importance of SCM strategies but also highlights the significance of targeted approaches, such as customer-centricity and supplier management, in driving operational excellence within the garment industry.

Shiboub et al. (2019) undertake a comprehensive exploration of supply chain network design, concentrating on the interplay between cost and quality aspects. They introduce a novel nonlinear optimization model that not only integrates the allocation of cost of quality (COQ) but also takes into account various other influential factors in supply chain decision-making. This innovative approach sheds light on the intricate relationship between quality considerations, expenses, investments, and transportation costs in the realm of supply chain management. By utilizing this model, the study elucidates the intricate dynamics involved in designing supply chain networks that are simultaneously cost-effective and high in quality. Through their research, Shiboub et al. (2019) contribute to a deeper understanding of how a holistic approach to supply chain design, encompassing both financial and quality-related factors, can intricately impact the configuration of supply chain networks and subsequently influence overall operational performance.

The literature review further accentuates the recurring theme of integration and coordination, which has garnered substantial attention in recent scholarly discourse. Collaborative research by Cao and Zhang (2016), Chen et al. (2018), Gunasekaran et al. (2017), and Queiroz et al. (2020) converges to posit that the integration and seamless coordination of supply chain processes, coupled with the incorporation of cutting-edge technologies, yield positive repercussions for operational performance. These studies collectively underscore the pivotal

role of these practices in fostering heightened information sharing, improved demand forecasting accuracy, streamlined inventory management, and optimized production planning strategies. By advocating for a synchronized approach to supply chain activities and the utilization of advanced tools, these studies collectively advocate for a holistic paradigm that bolsters the operational performance of organizations. The synthesis of their findings reinforces the notion that integration and technological innovation serve as catalysts for enhanced operational efficiency across various domains.

Investigations into sustainable supply chain management practices, a pivotal realm encompassing environmental and social responsibility, come to the fore through the scholarly endeavors of Dubey et al. (2015) and Govindan et al. (2021). Their studies jointly underline the compelling merits of integrating sustainability considerations into operational frameworks. Dubey et al. (2015) and Govindan et al. (2021) align in highlighting the pronounced positive influence of sustainable practices on operational performance. By fostering the reduction of costs through judicious resource employment and advocating responsible environmental stewardship, these practices pave the way for a more economically efficient and ecologically conscious operational landscape. Additionally, these studies collectively spotlight the overarching enhancement of overall performance as a direct consequence of embedding sustainable practices into the organizational fabric. This convergence of research underscores the pivotal role that sustainable supply chain management plays in driving not only operational efficiency but also broader organizational success, resonating across diverse sectors and industries.

The pivotal significance of resilience and agility in the realm of supply chains takes center stage through the insightful works of Ivanov et al. (2019) and Golan et al. (2022). Their studies jointly underscore the paramount importance of cultivating adaptive and resilient supply chain systems capable of navigating disruptions and uncertainties. Ivanov et al. (2019)

and Golan et al. (2022) concur in emphasizing how supply chains endowed with agility and resilience can effectively respond to unforeseen events, thereby ensuring the uninterrupted flow of operations. By proactively adjusting to dynamic conditions and swiftly recovering from setbacks, these agile and resilient systems mitigate the adverse impacts of disruptions, ultimately safeguarding operational performance. This convergence of research sheds light on the instrumental role that resilience and agility play in the intricate dance of supply chain management, attesting to their ability to fortify operational stability even in the face of unexpected challenges and uncertainties, fostering operational continuity and excellence.

Transitioning to the domain of Total Quality Management (TQM), the review illuminates the multifaceted dimensions it encompasses, including customer orientation, leadership commitment, employee involvement, continuous improvement, and process management. This comprehensive framework is evidenced by studies by Talib et al. (2015), Iqbal et al. (2015), Al-Dhaafri et al. (2016), and Sadikoglu and Zehir (2016), collectively underscoring the profound positive impact of these TQM facets on operational performance. These studies collectively highlight the pivotal role that customer-centricity, unwavering leadership dedication, active employee engagement, continuous refinement, and streamlined process management play in propelling operational excellence. By enhancing customer satisfaction, fostering a culture of dedicated leadership, invigorating the workforce's commitment, and promoting ongoing betterment, these TQM principles synergistically bolster operational performance. This convergence of research elucidates how TQM, with its multifarious elements, acts as a linchpin for augmenting operational efficiency and effectiveness across diverse sectors and organizational contexts.

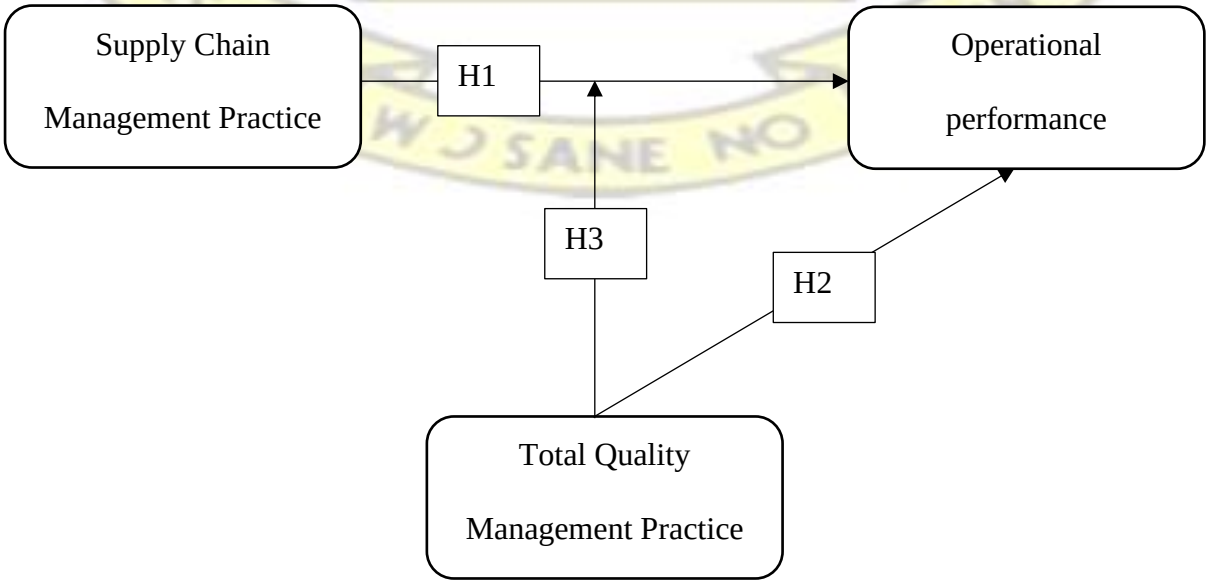
The confluence of Total Quality Management (TQM) with Supply Chain Management (SCM) is a pivotal focus, explored by Garza-Reyes et al. (2016), Sadikoglu and Olcay (2014), Alfalla-Luque et al. (2018), and Arawati and Saudah (2017). Their collective research

underscores the transformative potential of synergizing TQM and SCM practices to enhance operational performance. These studies underscore how TQM acts as a dynamic moderator in the relationship between SCM strategies and operational performance outcomes. By effectively aligning the principles of TQM, such as customer-centricity, continuous improvement, and process management, with SCM practices, organizations can optimize their supply chain processes and achieve amplified operational excellence. This synthesis of research not only accentuates the symbiotic relationship between TQM and SCM but also highlights their potential to drive superior operational outcomes, emphasizing the intrinsic value of a harmonized approach to these complementary paradigms within the broader framework of organizational management.

2.4 Conceptual Framework

The conceptual framework is a graphical presentation of relationships among constructs. In this conceptual framework, there is a graphical presentation of relationships among constructs. In this study, a conceptual framework is presented for the effects of supply chain management and operational performance on oil and gas firms. Based on this assumption, figure 2.1 is presented.

Figure 2.1 Conceptual Framework



2.5 Hypothesis Development

2.5.1 Supply Chain Management and Operational Performance.

Truong et al., (2017) examine the relationship between practices of supply chain management (SCM) and operational performance (OP). the study adopted the Structural equation model to validate the model with the data were collected in Vietnamese garment enterprises. The study reveals that SCM practices have a “resonant” influence on OP that can explain 52.6 percent variance of this output concept. In particular, customer focus and supplier management both direct and indirect impact on OP while top management support and process control/improvement only have indirect and direct influences on OP, respectively.

Shiboub et al. (2019) researched supply chain network design based on cost level and quality level analysis. The purpose of this study is the impact of the cost of quality (COQ) allocation on the capacity supply chain (SC) network. This paper proposes a nonlinear optimization model that combines opportunity cost (OC) (that is, customer satisfaction cost) with the COQ of QL considered in supply chain network design decisions. In addition, it examines the impact of investment thinking on all levels of HSC to ensure the overall best QL. A numerical example is provided to illustrate the behaviour of the model. The results show how QL, COQ, and facility location decisions change when OC, investment, and transportation costs are integrated into the SC model.

Furthermore, A prominent theme in recent literature is the positive impact of integration and coordination on operational performance. Cao and Zhang (2016) assert that effective supply chain integration enhances operational performance by reducing lead times, improving inventory management, and lowering costs. Similarly, Chen et al. (2018) find that supply chain coordination positively influences operational performance by promoting information sharing, collaborative planning, and joint decision-making among supply chain partners. Also, Gunasekaran et al. (2017) argue that efficient information sharing practices, facilitated by advanced information and communication technologies, lead to better demand forecasting, inventory management, and production planning, ultimately enhancing operational performance. Furthermore, Queiroz et al. (2020) find that the adoption of technologies such as the Internet of Things (IoT) and blockchain has a positive impact on operational performance by increasing visibility and transparency across the supply chain.

Moreover, Dubey et al. (2015) find that GSCM practices, such as eco-design, reverse logistics, and waste reduction, can enhance operational performance by reducing costs and improving resource utilization. In a more recent study, Govindan et al. (2021) demonstrate that sustainable supply chain management practices, including social responsibility and environmental performance, positively impact operational performance. In addition, Resilient and agile supply chains have become a priority for businesses in the face of disruptions and uncertainties. Ivanov et al. (2019) argue that agile supply chains can quickly adapt to market changes and maintain operational performance, even during unexpected events. Furthermore, Golan et al. (2022) find that supply chain resilience, characterized by the ability to recover from disruptions, is positively related to operational performance, as firms with resilient supply chains can rapidly restore operations and minimize negative impacts. Based on the empirical literature reviewed, the following hypotheses can be formulated:

H1: supply chain management practices have a positive relationship with operational performance.

2.5.2 Total quality management practice and operational performance.

The management strategy known as Total Quality Management (TQM) aims to enhance the quality of organizational products, services, and processes through an emphasis on perpetual improvement and the satisfaction of customers (Chiguvi, 2016; Pambreni et al., 2019; Sweis et al., 2019). Total Quality Management (TQM) comprises various elements such as customer orientation, commitment from leadership, participation of employees, ongoing enhancement, and management of processes (Goetsch & Davis, 2014). Numerous research endeavors have delineated the explicit and implicit impacts of the aforementioned constituents on functional efficacy, as explained subsequently.

The principle of TQM revolves around customer focus, with the objective of meeting and exceeding customer expectations, as stated by Sila (2007). Talib et al. (2015) conducted a study that revealed a direct correlation between customer-centricity and operational performance. Specifically, organizations that prioritize the satisfaction of customer needs exhibit superior levels of performance. The implementation of total quality management (TQM) requires the crucial element of leadership commitment. The support and involvement of top management are imperative for the success of TQM, as stated by Prajogo and Sohal (2006). Numerous academic inquiries, including the research conducted by Iqbal et al. (2015) and Elshaer et al. (2020), have established a favorable correlation between the level of commitment exhibited by leaders and the operational performance of an organization.

Employee involvement pertains to the active engagement and authorization of employees in the processes of decision-making and problem-solving (Demirbag et al., 2006). Research conducted by Al-Dhaafri et al. (2016) and Sousa & Voss (2002) has demonstrated that increased employee engagement in Total Quality Management (TQM) practices is positively associated with enhanced operational performance. According to Oakland (2014), the idea of continuous improvement is the constant improvement of goods, services, and procedures in order to achieve superior performance. According to Sadikoglu and Zehir's (2016) research, organizations that place emphasis on ongoing enhancement tend to achieve superior levels of operational performance.

In addition, according to Flynn et al. (1995), the idea of process management refers to the methodical regulation and improvement of organizational procedures with the goal of minimizing variations and achieving uniform results. According to the findings of Junni and Saru (2017) and Salaheldin (2009), there is evidence in the literature that effective process management can have a positive impact on operational performance. Significantly, a number of research studies have established a favorable correlation between total quality management (TQM) practices and operational performance. Kaur et al. (2015) conducted a study within the automotive industry and discovered that the implementation of total quality management (TQM) has a positive impact on operational performance. The findings of Zehir et al. (2015) and Quang et al. (2018) indicate that the implementation of TQM practices can result in enhanced operational performance in the manufacturing and service industries, respectively. Furthermore, Elg et al. (2017) conducted a meta-analysis that revealed that total quality management (TQM) practices have a positive impact on operational performance in various industries. This finding supports the notion that there is a favorable association between TQM

and operational performance. Drawing from the extant literature, the present study posits the following hypothesis:

H2: There is a positive relationship between Total quality management practice and operational performance.

2.5.3 TQM, SCM and Firm Performance.

Total quality management (TQM) can potentially serve as a pivotal factor in regulating the interconnection between supply chain management (SCM) and operational performance. The concept of supply chain management (SCM) pertains to the deliberate synchronization of organizational functions within a firm and inter-organizational process across the supply chain to enhance the overall efficiency and long-term performance of the supply chain (Chopra & Meindl, 2016). Within this particular context, total quality management (TQM) functions as a guiding ideology that guarantees quality regulation and ongoing enhancement across the entire supply chain (Foster & Ogden, 2008).

According to a study by Garza-Reyes et al. (2016), the combination of supply chain management (SCM) and total quality management (TQM) practices improved operational performance in manufacturing companies. The research conducted has identified several crucial Total Quality Management (TQM) practices, including but not limited to leadership commitment, employee involvement, and continuous improvement. These practices have been found to be significant factors that have a considerable impact on the effectiveness of supply chain management (SCM) practices. Sadikoglu and Olcay (2014) conducted a study to investigate the impact of total quality management (TQM) practices on the correlation between supply chain management (SCM) and operational performance within the automotive sector. The research discovered that Total Quality Management (TQM)

methodologies, such as prioritizing customer needs and managing processes, had a noteworthy moderating effect on the correlation between Supply Chain Management (SCM) practices and operational performance.

Alfalla-Luque et al. (2018) conducted a research study on the food industry and discovered that the amalgamation of total quality management (TQM) and supply chain management (SCM) practices had a favorable effect on operational performance. The research proposed that the integration of Total Quality Management (TQM) principles into the supply chain operations of organizations can lead to improved efficiency and overall performance. Arawati and Saudah (2017) conducted a study to look at the moderating impact of total quality management (TQM) practices on the relationship between supply chain management (SCM) practices and operational performance within the textile industry. The research revealed that the integration of Total Quality Management (TQM) methodologies, including but not limited to customer-centricity, process administration, and ongoing enhancement, within Supply Chain Management (SCM) practices had a noteworthy positive impact on operational efficacy. Drawing from the extant literature, the present study posits the following hypothesis:

H3: TQM practices positively moderates the relationship between SCM and operational performance.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the methodology of the study on supply chain management and its impact on oil and gas production. The chapter presents the following: Section 3.1 presents the research design; section 3.2 presents the population of the study; section 3.3 presents the sample and sampling techniques; section 3.4 presents the data and data collection; section 3.5 presents the validity and reliability of constructs and variables; and section 3.6 presents ethical consideration.

3.1 Research Design

According to Fusch, Fusch, and Ness (2017), the methodology employed to address a research inquiry is referred to as "research design." According to Mohajan's (2018) findings, the utilization of a research design allows for the depiction, observation, and documentation of various elements within a given scenario in their organic state, as opposed to providing an explanation for them. According to Saunders et al. (2011), research projects can be classified into three major categories based on their purpose: exploratory, descriptive, and explanatory research. The exploratory research design endeavors to investigate the precise characteristics of a given problem (Casula, Rangarajan, & Shields, 2021). Cooper and Schindler (2014) posit that research studies can be classified into two categories based on their primary objectives. Descriptive studies aim to determine the who, what, where, when, or how much of a phenomenon exists, while explanatory studies seek to understand the underlying reasons or mechanisms that cause changes in one variable due to another. The present investigation employed a descriptive study design to elucidate the predictive efficacy of supply chain practices on organizational performance.

The study utilized a cross-sectional survey design to examine and validate the proposed associations. In addition, the implementation of a well-structured survey aids in the acquisition of data that may not be easily accessible while also enabling statistical inference and the possibility of reproducing findings (Bloomfield, Nelson, and Soltes, 2016). This study has employed the epistemological perspective of positivism. Positivism is a philosophical framework that acknowledges only those claims that can be scientifically demonstrated or verified through mathematical or logical proof. The research employed a quantitative methodology for data gathering. The study employed a survey method to gather quantitative data, utilizing a self-administered questionnaire approach. The selection of this methodology is grounded in a comprehension of the fundamental philosophical considerations involved in selecting a research approach that aligns with the research goals. The design of the study is grounded in a positivist philosophical perspective and utilizes a quantitative research methodology.

3.2 Population of the Study

According to Gorman et al. (2005), the term "population" in a research study refers to a clearly identifiable and comprehensive group of elements that are of interest to the researcher and are being investigated. As per Ireri's (2011) assertion, a population can be defined as a distinct collection of individuals, entities, occurrences, provisions, clusters of objects, or residences that are the subject of scrutiny or inquiry. The present study's population frame encompasses all oil and gas companies operating in Ghana. The study is centered on 15 oil and gas companies situated in the metropolitan areas of Accra and Takoradi. This decision was made based on the researcher's time constraints and the impracticality of covering the entire country. This study specifically targets purchasing managers, operations and

production managers, transport managers, logistics or materials managers, design managers, and warehouse managers, as they possess significant expertise in supply chain management across different organizations.

3.3 Sample and Sampling Techniques

The term "sample," as defined by Rea and Parker (2014), refers to a specific subset of the study population that is the primary focus of the researcher's investigation. The act of selecting units, such as individuals, from a population of interest for the purpose of studying the sample and drawing conclusions that can be reasonably applied to the population from which it was derived is known as sampling (Trochim and Donnelly, 2001). The categorization of sampling techniques can be classified into two distinct types, as proposed by Taherdoost (2016). The first type is probability sampling, which ensures that each member of the population has an equal opportunity to be chosen. This type includes various methods such as simple random, stratified random, and systematic sampling, among others (Sharma, 2017; Iliyasu and Etikan, 2021). The two main types of sampling methods are probability and non-probability sampling. In non-probability sampling, the likelihood of each case being chosen from the entire population is unknown. Examples of non-probability sampling include quota, purposive, and snowball sampling, among others (Acharya et al., 2013). The research employed the purposeful sampling technique to gather data from participants. Purposive sampling is a method that facilitates the researcher's ability to choose cases that are pertinent to addressing research inquiries and fulfilling objectives (Ishak and Abu Bakar, 2014). Alternatively, it allows the researcher to utilize cases that possess the necessary information in relation to the aims of their investigation (Naderifar, Goli, and Ghaljaie, 2017).

According to Singh and Masuku (2014), the sample size has a significant impact on the precision of survey findings. According to Tabachnick and Fidell's (2013) formula, a sample size can be calculated as N > 50 + 8m, where m represents the number of independent variables in the study, in order to ensure a dependable equation (p. 123). As per the research conducted by Hair et al. (2006), it is recommended that a minimum of one variable be included for every ten respondents (1:10) in a sample. According to Malik and Masood's (2015) recommendation, a reliable equation for social science research requires approximately 15 participants per predictor. Utilizing the formula proposed by Tabachnick and Fidell (2013), it has been determined that a sample size of 66 participants, which is equivalent to 50 plus 8 multiplied by 2, is deemed adequate for the present investigation. In accordance with Stutely's (2003) suggestion of a minimum sample size of 30 for statistical analyses within each category, this study deliberately opted for a sample size of one hundred and sixty (160) respondents, taking into account the possibility of non-responses and missing data.

3.4 Data and Data Collection

The present study involved the collection of both primary and secondary data. A self-administered questionnaire that collected primary data and presented the factual information obtained allowed the study to accomplish its goal.

3.4.1 Variables Description and Measurement (data and variables)

Table 3.1 Research Instrument and Sources and Measures

Construct	Sub construct	Reference	Items
Supply chain	Information management	Vanichchinchai, (2014)	6
	Lean system	Vanichchinchai, (2014)	10

management practice		Truong ET AL., (2017)	
	Partnership management	Vanichchinchai, (2014)	6
	Strategy and organization	Vanichchinchai, (2014)	6
Total quality management practice	Commitment and strategy	Vanichchinchai, (2014)	4
	Customer focus	Truong ET AL., (2017) Vanichchinchai, (2014)	3
	Human resource management	Vanichchinchai, (2014)	7
Operational performance		Sharma and Modgil, (2020)	7

3.4.2 Data Collection Instruments

The survey instrument was organized into four distinct sections, namely: demographic data, supply chain management practices, total quality management, and operational performance. The demographic section of the survey gathered information pertaining to the attributes of the participant's organization, utilizing a set of five items. Sections B and C are customary inquiries that evaluate the impact of supply chain management and operational performance within the Ghanaian oil and gas industry. The survey questions pertaining to the outcomes were formulated utilizing a 5-point Likert scale ranging from a score of 1, indicating strong disagreement, to a score of 5, indicating strong agreement. The questionnaire model utilized in the study was derived from Harmon and Cowan's (2009) work. Prior to administering the questionnaire, the researcher provided a concise explanation to the respondents regarding the rationale and objectives of the research study, apprised them of their voluntary participation rights, and guaranteed the confidentiality of their responses. Hence, the researcher contemplated dispatching questionnaires to the chosen enterprises, with a sole focus on the

senior management. A 14-day period was allocated to accommodate the respondents' hectic schedules. Subsequent telephone communications were conducted to provide a gentle reminder to the participants regarding the completion of the questionnaires.

3.5 Validity and Reliability of Constructs/Variables

The researcher conducts a pilot study to evaluate the suitability and credibility of the data collection tool. Consequently, the investigator intends to administer the data collection tool to a cohort of 20 participants who work as staff in the oil and gas sector. The aforementioned practice affords the researcher an occasion to ascertain the respondents' comprehension of the research inquiries and enables the opportunity to rectify and enhance the questions, thereby augmenting the lucidity of the questions and yielding dependable and sound responses to the research questions (Persaud, 2012a). Subsequently, the Cronbach's alpha coefficient will be utilized to ascertain the dependability of the data. In order to determine the reliability of a questionnaire, the rule of thumb for interpreting reliability coefficients is commonly utilized. This involves assessing coefficients that fall within specific ranges, including 0.90 or above, 0.80 to 0.89, and 0.70 to 0.79, which are indicative of high, very good, good, and adequate reliability, respectively (Multon and Coleman, 2012).

3.6 Ethical Consideration

The attainment of the objective of this research necessitates the collaboration of diverse participants who will be selected for the study, as well as the accessibility of pertinent literature authored by some scholars. Several ethical concerns are crucial in guaranteeing the achievement and legitimacy of a research result. The research will be carried out with the utmost integrity. Initially, the researcher will acquire an introductory letter from the department in order to facilitate convenient access to the selected oil and gas companies.

Furthermore, participants will receive a guarantee of the privacy and confidentiality of their answers, the preservation of their anonymity, and the utilization of the information furnished solely for academic objectives. The pertinent literature will be duly cited and referenced to facilitate the present study. In order to achieve the study objectives, the collected data will be subjected to appropriate analysis techniques, and the resulting findings will be presented in an unaltered manner to ensure the credibility and accuracy of the study outcomes.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Introduction

In this chapter, the data gathered was analysed and the findings presented and discussed. The findings from the research fields are presented using a variety of statistical and inferential approaches. The presentation is organized in accordance with the study objectives and questions indicated in the first chapter of the study. SPSS version 25 was used to conduct the analysis in this study. To take the findings, the study used frequencies, tables, and descriptive statistics. The results are also discussed in congruence with literature in chapter two of the study.

4.2 Demographic profile of Respondents

The data presented below shows the demographic distribution of 164 respondents across five categories: Gender, age, position/role, educational background, and working experience. The first category, gender, shows that 114 of the respondents were male representing (69.5%) and 50 of the respondents were female representing (30.5%) out of the total 164 respondents. The second category, age, indicates that 18 respondents were below 30 years of age representing (11.0%), 101 of the respondents were between 30-39 years of age representing (61.6%), and 45 of the respondents were between 40-49 years of age representing (27.4%) out of the total 164 respondents. The educational background shows that 5 of the respondents had SSCE/WASSCE, Diploma/HND certificates representing (3.0%), 76 of the respondents had bachelor's degree certificate representing (46.3%), 81 of the respondents had master's degree representing (49.4%) and 2 of the respondents had PhD representing (1.2%). The respondents working experience shows that 37 of the respondents had 3-5 years working experience representing (22.6%), 55 of the respondents had 5-10 years of working experience

representing (33.5%), 30 of the respondents had 10-20 years of working experience representing (18.3%), and 42 of the respondents had above 20 years of working experience representing (25.6%) out of the total 164 respondents. The positions held by respondents was in five categories. Consequent to this, majority of the participants constituting 75(45.7%) were procurement managers, 26(15.9) of the respondents were supply chain mangers, 31(18.9%) of the respondents were warehouse managers, 11(6.7%) were operations managers, and 21(12.8%) were risk managers.

Table 4.1 Demographic of respondents

Variable	**Frequency (164)**	**Percentage (%)**
Gender		
Male	114	69.5
Female	50	30.5
Total	164	100.0
Age		
Under 30 years	18	11.0
30-39 years	101	61.6
40-49 years	45	27.4
Total	164	100.0
Position		
Operations manager	11	6.7
Supply chain manager	26	15.9
Warehouse manager	31	18.9
Procurement manager	75	45.7
Risk manager	21	12.8
Total	164	100.0
Education		
Below bachelor's degree	5	3.0
Bachelor's degree	76	46.3
Master's degree	81	49.4

Above master's degree	2	1.2
Total	164	100.0
Working Experience		
3-5 years	37	22.6
5-10 years	55	33.5
10-20 years	30	18.3
More than 20 years	42	25.6
Total	164	100

Source: Field Data (2023)

4.2 Reliability test

Reliability analysis is a critical step in assessing the consistency and stability of the constructs. One of the commonly used measures of reliability is Cronbach's alpha (Robert, 2003). A Cronbach's alpha value of 0.7 or higher is considered acceptable for social science research. The reliability analysis for supply chain management construct produced a Cronbach's alpha value of 0.967, which indicates high internal consistency. This means that the twenty-eight items within the construct are measuring the same underlying concept.

The reliability analysis for total quality management construct produced a Cronbach's alpha value of 0.962, indicating high internal consistency. This suggests that the fourteen items within the construct are measuring the same underlying concept with a high level of consistency and lastly, the reliability analysis for operational performance construct produced a Cronbach's alpha value of 0.952, indicating high internal consistency. This suggests that the seven items within the construct are measuring the same underlying concept with a high level of consistency. Overall, the Cronbach alpha score for the forty-nine items is 0.982.

Table 4.2 Reliability test

Variable	Number of items	Cronbach's alpha
Supply chain management	28	0.967
Total quality management	14	0.962
Firm performance	07	0.952

Source: Field Data (2023)

4.3 Descriptive Statistics

The respondents were asked to rate supply chain management, total quality management and firm performance which was presented in Likert level scale based on strongly disagree to strongly agree.

Supply chain management was developed by twenty-eight items using Likert Scale. All statements were measured on a five-point scale where 1 represents strongly disagree, 2 represents disagree, 3 represents neutral, 4 represents agree and 5 represents strongly agree. The mean value of 3.7435 with a standard deviation of 0.79002 implies that the respondents generally agreed with the statements under the variable. Again, the respondents were asked about total quality management, generally the respondents agreed with the statements under the variable which constitute fourteen items. Moreover, the respondents agreed with the statements under firm performance which constitute seven items.

Table 4.3: Mean and Standard Deviation

Variables	Mean	Standard Deviation
Supply chain management	3.7435	0.79002
Total quality management	3.8798	0.85256
Firm performance	3.7352	0.90907

4.4 Correlational test

Correlational analysis is carried out in this part of the study to test the bivariate relationship between the main constructs of the study. Besides socio-demographic variables such as age, gender and education were employed; supply chain management, total quality management and firm performance were the main constructs considered in the analysis. The direction and magnitude (coefficient) of the Pearson's bivariate correlational result of the variables is shown in Table 4.4. Supply chain management positively and significantly correlated with total quality management. Thus, increasing supply chain management is associated with increasing total quality management. Supply chain management was positively and significantly correlated with firm performance. Thus, increasing supply chain management is associated with increasing firm performance and lastly, total quality management positively and significantly correlated with firm performance. Thus, increasing total quality management is associated with increasing firm performance.

Table 4.4: Pearson's Correlation result

	Variables	**1**	**2**	**3**	**4**	**5**
1	Gender					
2	Age	-.072				
3	Education	.128	.156*			
4	Supply chain management	.050	.055	.050		
5	Total quality management	-.002	.000	.036	.840**	
6	Firm performance	.068	.005	.047	.764**	.808**

**&* Signifies Correlation at the 0.01 level and 0.05 level (2-tailed) respectively

4.5 Hypothesis Testing

This section tests the established hypothesis of the study;

4.5.1 Supply Chain Management and Firm Performance

The regression analysis presented in the data below indicates the relationship between supply chain management and firm performance. The model shows a positive correlation between supply chain management and firm performance with an R-squared value of 0.583 which implies that 58.3% of the variation in supply chain management can be explained by firm performance. The table shows that the regression model is significant ($F = 226.696$, $p < 0.001$), indicating that supply chain management has a significant impact on firm performance. The standardized coefficient indicate that supply chain management has a high positive impact on firm performance. This means that an increase in supply chain management would lead to 76.4% increase in firm performance. The regression analysis provides evidence of a significant positive relationship between supply chain management and firm performance.

Table 4.5.1: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.446	.223		1.995	.048
	SCM	.879	.058	.764	15.056	.000
a. Dependent Variable: Firm performance						

Note: $F = 226.696$ ($p < .001$), $R^2 = .583$, SCM = Supply Chain Management

4.5.2 Total Quality Management and Firm Performance

For the purpose of assessing the effect of total quality management on firm performance, a simple linear regression analysis was conducted among them where total quality management was the independent construct and firm performance was the dependent construct. The r-squared indicates the proportion of variance in the dependent variable that can be demonstrated by the independent variable. Results of the regression model indicated that there was a significant and positive relationship between total quality management and firm performance, and that total quality management accounted for about 65.3% of the variability in firm performance. The results support H2. To ascertain if the model is a good match for the data, the analysis of variance was utilized. The significance level was found to be 0.000 which is below 0.05, indicating that the model or illustration is effective in predicting how total quality management impacted firm performance. Lastly, the model indicates that a unit increment in total quality management would lead to 80.8% increase in firm performance. The implications of the current research mean that total quality management has an influence on firm performance.

Table 4.5.2: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.392	.196		2.000	.047
	TQM	.862	.049	.808	17.465	.000
a. Dependent Variable: Firm performance						

Note: $F = 305.038$ ($p < .001$), $R^2 = .653$, TQM = Total Quality Management

4.5.3: Moderating Effects of Total Quality Management

This section presents results for the moderating effects of total quality management in the relationship between supply chain management and firm performance. The results indicate that there was non-significant interaction between supply chain management and firm performance (β = -.0717, t = -1.6786, LLCI = -.1560, ULCI = .0126). The model was not able to significantly predict total quality management in moderating effect of supply chain management and firm performance. This means that the link between supply chain management and firm performance is not determined by total quality management in this study. The inferences from the current research are that total quality management cannot serve as a pivotal factor in regulating the interconnection between supply chain management (SCM) and operational performance.

Table 4.7 Moderating effects of total quality management

	B	SE	T	ULCI	LLCI
Dependent variable: FP					
Supply chain management	-.1485	.0942	-1.5762	-.3343	.0373
Total quality management	.2852	.1116	2.5545	.0650	.5053
Int_1 (**SCM * FP)**	.0897	.0377	2.3804	.0154	.1640

Note: SCM = Supply Chain Management, FP = Firm Performance LLCI = Lowe-level confidence interval, ULCI = Upper-level confidence interval

4.6 Discussion of Results

4.6.1 Supply Chain Management and Firm Performance

The primary objective was to delve into the intricate relationship existing between supply chain management (SCM) practices and the overall performance of firms within the context of the oil and gas industry. This investigation involved employing rigorous regression

analysis techniques to uncover insights into this correlation. The results of the regression analysis unveiled a noteworthy and optimistic correlation between the effectiveness of supply chain management practices and the performance of firms, establishing a vital link between these two critical factors. The derived R-squared value of 0.583 indicated that approximately 58.3% of the fluctuations observed in supply chain management outcomes can be attributed to corresponding fluctuations in firm performance. This statistical measure demonstrates a moderate-to-strong explanatory power of the model in illustrating the relationship under scrutiny.

The statistical significance of the regression model was strongly affirmed by the F-statistic, where a value of 226.696 was obtained, with an associated p-value of less than 0.001. This p-value indicates that the probability of observing such a substantial relationship between supply chain management and firm performance due to random chance alone is exceedingly low, thereby substantiating that the impact of supply chain management on firm performance is indeed meaningful and beyond the realm of mere chance. Further delving into the analysis, the standardized coefficient (Beta) emerged as a valuable metric in understanding the magnitude of the impact of supply chain management on firm performance. This coefficient indicated that supply chain management wields a substantial and positive influence on firm performance. Specifically, it was revealed that an augmentation in the efficiency and effectiveness of supply chain management practices could potentially yield an impressive 76.4% enhancement in firm performance, thereby underscoring the profound implications of adept supply chain management practices for overall business success.

To encapsulate, the outcomes of the analysis provided compelling empirical evidence affirming the existence of a significant, constructive, and robust relationship between the calibre of supply chain management strategies employed within the oil and gas industry and the subsequent performance outcomes of firms operating within this sector. The rigorous

statistical analysis underscored not only the importance of proficient supply chain management but also illuminated the potential magnitude of its impact on overall firm performance. These findings resonate with the growing recognition of supply chain management as a pivotal factor in driving business success, particularly in complex and multifaceted industries such as oil and gas. As such, this study contributes to the extant body of knowledge by furnishing empirical substantiation to the discourse surrounding supply chain management's critical role in shaping firm performance outcomes.

The relationship between supply chain management (SCM) and firm performance is well-established in the literature. Truong et al. (2017) found that SCM practices have a significant positive impact on operational performance. Cao and Zhang (2016), Chen et al. (2018), Gunasekaran et al. (2017), Queiroz et al. (2020), Dubey et al. (2015), Govindan et al. (2021), Ivanov et al. (2019), and Golan et al. (2022) collectively provide evidence that supply chain integration, coordination, information sharing, technology adoption, and resilience lead to better operational performance. Based on this body of research, it's reasonable to conclude that SCM positively influences firm performance.

4.6.2 Total Quality Management and Firm Performance

The second objective aims to evaluate the profound implications of total quality management (TQM) practices on the overall performance of firms. Through a comprehensive regression analysis, the intricate relationship between TQM and firm performance was unravelled, providing valuable insights into the impact of these practices on business outcomes. The outcomes of the regression analysis unveiled a notably robust and constructive relationship between the effective implementation of total quality management practices and the resulting performance metrics of firms. This vital linkage, elucidated through empirical analysis,

underscores the pivotal role that TQM plays in shaping and enhancing the overall performance of businesses. The statistical assessment, exemplified by the obtained R-squared value of 0.653, demonstrated that approximately 65.3% of the variations witnessed in firm performance can be attributed to the calibre of total quality management practices adopted by these firms. This substantial explanatory power of the model reinforces the relevance of TQM practices in driving favorable outcomes for businesses.

Furthermore, the significance level derived from the analysis of variance, indicated by a p-value lower than 0.05 ($p < 0.001$), reinforces the credibility and efficacy of the established model in effectively elucidating the manner in which total quality management exerts its impact on firm performance. This statistical inference firmly supports the contention that TQM practices have a tangible and consequential influence on the performance dynamics of firms, lending substantial credence to the strategic importance of incorporating quality-focused approaches in business operations. Delving deeper into the analysis, the standardized coefficient (Beta) emerged as a pivotal metric in quantifying the magnitude of the impact of TQM practices on firm performance. This coefficient, with a value reflecting an 80.8% increase in firm performance per unit increment in total quality management, reinforces the assertion that total quality management practices wield a potent and highly constructive influence on enhancing overall firm performance. This finding underscores the significance of investing resources and efforts in cultivating a culture of quality excellence, as it evidently translates into tangible improvements in business outcomes.

The literature, including studies by Talib et al. (2015), Iqbal et al. (2015), and Elshaer et al. (2020), supports the positive relationship between total quality management (TQM) practices and operational performance. These studies establish a direct correlation between customer-centricity, leadership commitment, employee involvement, continuous improvement, and operational performance. Total Quality Management (TQM) practices are shown to

positively affect operational performance. The research by Talib et al. (2015), Iqbal et al. (2015), Elshaer et al. (2020), Al-Dhaafri et al. (2016), Sousa and Voss (2002), Sadikoglu and Zehir (2016), Junni and Saru (2017), Kaur et al. (2015), Zehir et al. (2015), Quang et al. (2018), and Elg et al. (2017) collectively supports the idea that TQM practices, such as customer focus, leadership commitment, employee involvement, continuous improvement, and effective process management, contribute to better operational performance.

4.6.3 Mediating Effect of Total Quality Management

The objective of the study is to investigate the potential moderating influence of total quality management (TQM) on the interplay between supply chain management (SCM) strategies and overall firm performance. Through meticulous analysis, the nuanced dynamics of this interaction were explored, revealing insights into the extent to which TQM might moderate the relationship between SCM and firm performance.

The findings of this investigation illuminated a notable outcome – the interaction between supply chain management and firm performance, under the moderating effect of total quality management, failed to exhibit statistical significance. This conclusion was grounded in the calculated Beta coefficient of -0.0717 and the corresponding t-value of -1.6786. This outcome implied that the hypothesized moderating role of TQM in shaping the relationship between SCM practices and firm performance did not bear out in this study's context. The non-significant Beta coefficient further supported this inference, indicating that the level of moderation offered by TQM was limited and did not yield a discernible impact on the connection between SCM and firm performance.

Additional insights were garnered through a confidence interval analysis, which yielded a lower limit confidence interval (LLCI) of -0.1560 and an upper limit confidence interval (ULCI) of 0.0126. The positioning of these intervals further supported the lack of a

substantial moderating effect conferred by total quality management on the relationship between SCM and firm performance. The non-inclusion of zero in this interval range emphasized the consistent indication of non-significance. In effect, the culmination of these analyses led to the resounding conclusion that total quality management does not emerge as a significant determining factor in altering or regulating the connection between supply chain management practices and the overall operational performance of firms, at least within the scope and parameters of this study. While both SCM and TQM are recognized as crucial factors individually impacting firm performance, the study did not find compelling evidence for a meaningful interaction between these two factors in this specific context.

The moderating role of TQM in the relationship between SCM and operational performance is also discussed in the literature. Garza-Reyes et al. (2016) found that the combination of SCM and TQM practices improved operational performance. Sadikoglu and Olcay (2014) demonstrated that TQM practices moderate the relationship between SCM and operational performance within the automotive sector. Alfalla-Luque et al. (2018) and Arawati and Saudah (2017) suggest that the integration of TQM principles into SCM practices positively affects operational performance. Collectively, this body of research supports the notion that TQM can positively moderate the relationship between SCM and operational performance.

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CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

This section discusses and analyses the results of this study and presents the summary results of the study. It includes the findings related to the objectives of the study, such as the findings of the experiences in the previous chapter.

5.1 Summary of Findings

The following are the summary of the findings based on the established study objectives;

5.1.1 Supply Chain Management and Firm Performance

Supply chain management (SCM) has a significant positive impact on firm performance. The regression analysis reveals a strong correlation between SCM and firm performance, with an increase in SCM leading to a 76.4% increase in firm performance.

5.1.2 Total Quality Management and Firm Performance

Total quality management (TQM) positively affects firm performance. The regression analysis indicates a significant and positive relationship between TQM and firm performance, with TQM accounting for 65.3% of the variability in firm performance.

5.1.3 Mediating Effect of Total Quality Management

Total quality management does not significantly moderate the relationship between supply chain management (SCM) and firm performance. The interaction between SCM and firm performance, moderated by TQM, is found to be non-significant. TQM does not play a pivotal role in regulating this relationship.

5.2 Conclusion

The study assesses SCM's impact on operational performance in Ghana's oil and gas sector through three objectives. It explores the influence of SCM on efficiency and cost reduction, investigates TQM's relationship with efficiency and customer satisfaction, and explores TQM's moderating role in the SCM-operational performance link. The research design involves exploratory, descriptive, and explanatory approaches. A descriptive design and cross-sectional survey are employed, guided by positivism. Purposive sampling of 160 participants is justified, and data collection utilizes a Likert-scale questionnaire. The focus on managerial roles aligns with their supply chain expertise within 15 chosen companies.

Also, the demographic profile of respondents is detailed, covering gender, age, position, education, and experience. The distribution of 164 participants includes gender (69.5% male, 30.5% female), age groups (11.0% below 30 years, 61.6% 30-39 years, 27.4% 40-49 years), and various managerial roles. Education ranges from SSCE/WASSCE to PhD, and working experience varies. Reliability testing yields high Cronbach's alpha values (0.967, 0.962, 0.952) for constructs, ensuring internal consistency. Descriptive statistics reveal agreement with supply chain management, total quality management, and firm performance. Pearson's correlations highlight positive and significant relationships among constructs.

The study found out that supply chain management (SCM) significantly boosts firm performance, with regression analysis showing a 76.4% increase. Total quality management (TQM) positively affects firm performance, with TQM explaining 65.3% of performance variability. However, TQM does not significantly moderate the SCM-firm performance link; TQM's interaction with SCM does not have a substantial regulatory effect. It indicates organizations and management should implement robust supply chain management practices to leverage a potential 76.4% increase in firm performance. Additionally, embrace total quality management principles to enhance overall performance and efficiency.

5.3 Recommendation

The following are some the policies organizations can adopt and implement as strategies;

5.3.1 Supply Chain Management and Firm Performance

The finding that supply chain management (SCM) significantly influences firm performance holds significant implications for policymaking in business and economic sectors. Policymakers can use this insight to encourage and facilitate initiatives that enhance supply chain efficiency and integration. Implementing policies that promote collaboration between different players within the supply chain, such as suppliers, manufacturers, and distributors, can lead to a more seamless flow of goods and services, ultimately boosting firm performance.

Governments and regulatory bodies can also play a role by creating an environment that supports investments in technology and infrastructure that improve supply chain processes. For instance, offering incentives for companies to adopt advanced logistics systems, real-time tracking, and data analytics can contribute to improved SCM practices and, consequently, firm performance. Policymakers can also emphasize the importance of education and training programs to equip professionals with the necessary skills to manage complex supply chains effectively

5.3.2 Total Quality Management and Firm Performance

The positive relationship between total quality management (TQM) and firm performance has implications for policymaking in quality assurance and business standards. Policymakers can encourage the adoption of quality management frameworks and certifications by incentivizing organizations to implement TQM practices. Offering tax benefits or grants to companies that meet certain quality standards can drive broader adoption of TQM principles.

Furthermore, policymakers can support educational initiatives that promote awareness and understanding of TQM concepts among business professionals and managers. By emphasizing the significance of customer satisfaction, continuous improvement, and employee engagement, policymakers can contribute to a culture of quality consciousness within organizations.

5.3.3 Mediating Role of Total Quality Management

The non-significant moderating effect of total quality management (TQM) on the relationship between supply chain management (SCM) and firm performance highlights a potential area for policymaking intervention. Policymakers might focus on creating frameworks that encourage an integrated approach to both SCM and TQM. This could involve designing guidelines or best practice recommendations that outline how TQM principles can be effectively integrated into supply chain processes.

Additionally, policymakers can facilitate knowledge-sharing platforms, conferences, and seminars where industry experts can discuss strategies for optimizing both SCM and TQM simultaneously. Policymakers can contribute to fostering a culture of innovation by providing resources for collaborative research and development projects that explore innovative ways to align SCM and TQM practices.

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5.3.4 Suggestions for future research

Future research could delve into the mediating factors underlying the relationship between supply chain management and firm performance, considering industry-specific nuances. Additionally, investigating the contextual variables that influence the moderating effects of total quality management on the SCM-firm performance link could offer insights into diverse organizational settings. Longitudinal studies tracking the evolving impacts of SCM and TQM

practices, along with exploring synergies between SCM and other management approaches, stand as promising avenues for comprehensive investigations.

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APPENDIX

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

MSC PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

I am a Postgraduate student at the Kwame Nkrumah University of Science and Technology, Kumasi. This questionnaire seeks to solicit your views on the topic ***"Supply chain management and its impact on oil and gas production. A case study of oil and gas firms in Ghana."*.** It will take 5-10 minutes to respond to this questionnaire. Any information provided will ONLY be used for academic purposes, and it will be treated as HIGHLY CONFIDENTIAL. Thank you for participating in this survey.

SECTION A: DEMOGRAPHICS OF RESPONDENTS

Please write in ink by choosing the option which corresponds to the statement, which in your opinion is the most appropriate answer to the related question. For the following questions, kindly select by checking (✓) all that apply.

1. Gender of Respondent

a. Male ( ) b. Female ( )

2. Age of Respondent

a. Less than 30 years old ( ) b. 30 to 39 years old ( ) c. 40 to 49 years old ( )

d. More than 50 years old ( )

3. Education level of the respondent

a. Below bachelor's degrees ( ) b. Bachelor's degrees ( ) c. Master's degrees ( )

d. Above master's degrees ( )

4. Working experience

a. Less than 3 year ( ) b. 3 to 5 years ( ) c. 5 to 10 years ( ) d. 10 to 20 years ( )

e. More than 20 years ( )

5. Position

a. Operations Manager ( ) b. Supply chain manager ( ) c. Warehouse Manager ( )

` d. Procurement Officer ( ) e. Risk Manager ( )

SECTION B: SUPPLY CHAIN MANAGEMENT

Following statements in relation to the supply chain management as practice by your firm. Please indicate with a (√) or a tick on the scale below which of the following statement apply your firm.

Scale	**1= strongly disagree**	**2= disagree**	**3= neutral**	**4= agree**	**5= strongly agree**

	Items	**1**	**2**	**3**	**4**	**5**
Information management						
1	We contact the end-users of our products to get feedback on product performance and service.					

2	We work with our trade partners to survey and define customer requirement.					
3	We have a common standard for information sharing (e.g. product order, shipment, inventory) for our trade partners to follow.					
4	We evaluate formal and informal complaints as well as satisfaction of our trade partners.					
5	We effectively share information with our trade partners to facilitate business planning and react to changes.					
6	We apply advanced information technology in our supply chain.					
Lean system						
1	We delay final manufacturing activities until customer orders have actually been confirmed.					
2	We reduce inventory levels.					
3	We reduce set-up time.					
4	We order in small lot sizes.					
5	We streamline business processes (e.g. ordering, shipping, receiving and other paperwork) with our trade partners.					
6	We reduce response time.					
7	We have continuous improvement activity.					
8	We store our goods at appropriate distribution points close to					

	our customers.					
9	We involve in teams our trade partners to improve our supply chain.					
10	We have contingency management system for unexpected events.					
Partnership management						
1	We share knowledge about core business processes with our trade partners.					
2	We share improvement benefits as well as other risks and rewards with our trade partners.					
3	We develop a long-term relationship and trust with our trade partners.					
4	We rely on a small number of quality trade partners					
5	We participate in the sourcing decisions of our suppliers.					
6	We include our trade partners in our product development projects.					
Strategy and organization						
1	We have a supply chain performance measurement system.					
2	We certify our suppliers using supply chain performance criteria (e.g., quality, cost, delivery).					
3	We extend our trade partners to include partners beyond immediate suppliers and customers.					
4	We have organizational structure which facilitates business process integration with our trade partners.					

5	Our top-level managers strongly encourage employee (worker) involvement in supply chain management.					
6	Our employees (workers) are actively involved in supply chain management-related activities.					

SECTION C: TOTAL QUALITY MANAGEMENT PRACTICE

Please indicate with a (√) or a tick on the scale below which of the following items apply to firm's total quality management practice.

Scale	**1= strongly disagree**	**2= disagree**	**3= neutral**	**4= agree**	**5= strongly agree**

	Items	**1**	**2**	**3**	**4**	**5**
Commitment and Strategy						
1	Our top-level managers strongly encourage employee (worker) involvement in quality management.					
2	We have a clear vision, mission, policies, long term objectives and plan for improving quality.					
3	We have a clear quality goal and short-term business performance plans.					
4	Our top managers allocate adequate resources toward efforts to					

	improve quality.					
Customer Focus						
1	We have a system for collecting complaints or suggestions from customers.					
2	We actively seek ways to improve the products in order to achieve greater customer satisfaction.					
3	We have introduced and maintained the "customer focus" philosophy for a long time.					
Human Resource Management						
1	We provide training and training resources to employees (workers) and encourage them to attend these training programs.					
2	We have many active improvement teams.					
3	We actively evaluate and implement employees' suggestions related to quality and supply chain management, if they are suitable.					
4	Our line employees (workers) are responsible for and inspect the quality of their own work (self-inspection).					
5	We have an assistance mechanism (problem solving network) to help line employees solve quality problems.					
6	Our employees (workers) are actively involved in quality management-related activities.					
7	We provide awards to individuals and groups for excellent suggestions.					

SECTION D: OPERATIONAL PERFORMANCE

Please indicate with a (√) or a tick on the scale below which of the following items apply to firm's operational performance.

Scale	**1= strongly disagree**	**2= disagree**	**3= neutral**	**4= agree**	**5= strongly agree**

	Items	**1**	**2**	**3**	**4**	**5**
1	There is an increase in the amount of goods delivered on time in the last three years after TQM and SCM implementation.					
2	There is a decrease in inventory levels in the last three years after TQM and SCM implementation.					
3	There is a significant decrease in scrap rate in the last 3 years after TQM and SCM implementation.					
4	There is an enhancement in product quality/performance after TQM and SCM implementation.					
5	We have improved the capacity utilization over a period after TQM and SCM implementation.					
6	Our operations and processes are cost effective after TQM and SCM implementation.					
7	Our firm has introduced innovative products after TQM and SCM implementation.					

THANK YOU FOR YOU COOPERATION.