Enhancing The Supply Chain Collaboration Model in the Nigerian Oil and Gas Industry: A Case Study of Performance Improvement Strategies.

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Abstract

This research focuses on the issues of supply chain collaboration in the oil and gas industry, specifically in Nigeria. global inflation, geopolitical events, logistic complexity, worldwide pandemics, cultural reorientation, information system difficulties, process integration, and organisational restructuring are among the listed challenges. There is a paucity of frameworks or models in the existing literature to handle these supply chain collaboration difficulties unique to the oil and gas sector. Four supply management theories (Resource Dependency Theory, Transaction Cost Theory, System Theory, and Network Theory) were employed to support the thesis.

The researcher was motivated by personal experiences and realising the importance of the oil and gas sector to Nigeria's existence, the researcher seeks to investigate how supply chain collaboration might lead to industry performance improvement. The researcher is particularly interested in comprehending supply chain dynamics in the Nigerian oil and gas industry, as well as how collaboration might reduce obstacles associated with obtaining inputs. The purpose is to provide a steady supply of oil and gas products on the market, enhance operations, and address challenges caused by poor infrastructure and unclear government policies.

A qualitative research method was used to fulfil these study aims, with an emphasis on gaining insights from managers and employees at four selected companies: NNPC, A. A. Rano, Total Nigeria, and Rain Oil. The obtained data was thematically analysed to identify significant pattern about supply chain collaboration leading to performance improvement. The study contributes to existing knowledge by identifying sixteen key findings, which include goal alignment, teamwork, performance management, relationship management, timeliness and order management, quality management, infrastructure, decision making, finance, COVID-19 pandemics, infrastructure development, poor leadership, process monitoring and evaluation, business strategy management, training and development, and good planning.

Moreover, this study fills a gap in the literature by integrating these sixteen findings to develop a supply chain collaboration model as an effective strategy for mitigating supply chain challenges in the Nigerian oil and gas industry. The model was validated by managers from the participating companies, affirming its potential for performance improvement.

In conclusion, this study helps better understand the difficulties the Nigerian oil and gas supply chain faces. It also includes a verified model that can be used to improve performance and offers insights into the advantages of supply chain collaboration. To further knowledge in this field, recommendations are provided for future studies, such as use of quantitative research method, comparative or mixed-method research, to further examine supply chain problems in the Nigerian oil and gas sector and related themes using case studies.

Keywords: supply chain collaboration, collaborative supply chain, supply chain management, supply chain performance, Nigeria, oil and gas industry, enablers of supply chain collaboration, supply chain theory.

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This thesis would not have been possible without the aid of many distinguished scholars. Let me start by showing my deepest gratitude and thanking to Professor Emeritus William Bill Ion (Retired first supervisor) and Dr Andy Wong Current supervisor), who in their capacity provided me with the required advice, guideline, direction, and devotion to ensure my achievement. Their enormous insight and broad understanding of supply chain management possessed by both of my supervisors supported me in attaining the necessary insight and capacity to complete my thesis. With their patient instruction and encouragement, my supervisors helped me overcome technical and non-technical obstacles at various stages of this project. They guided me through the thesis writing process, showing me how to select a topic, gather data, employ analytic software, and present my findings. All their well-reasoned ideas and helpful criticism go a long way toward improving the overall quality of my thesis. I am especially grateful for their encouragement during the composition of my thesis.

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Without the encouragement and support of my family, I would not have been able to complete my PhD thesis. I'm grateful to my parents, Mr and Mrs Ositadimma Peter Olisah and Mr and Mrs Ojukwu Hyginus Udeh, who always kept an eye on me while I was on my academic journey and cheered me on when I was sad or seemed frustrated with my progress. During these difficult times, my wife, Mrs. Loveth Nwamaka Olisah, and my daughter, Kosaraolisah Gabriella Olisah, were my source of strength when putting additional effort and facing extremely laborious states. I want to express my gratitude to my wife, who has supported me incredibly as I pursue my Ph.D. As a result, I can confidently state that this thesis would not exist had it not been for the love and support of my family.

Many people contributed to the creation of this thesis, and for that, I am truly grateful. I attribute the accomplishment of my PhD to their assistance. With their motivation propelling me on, I know that this is not the end but the beginning of new pathways. My goal in life is to share everything I've learned through this PhD with the students, scholars, and industry practitioners I come into contact within the future.

Dedication

This Research is dedicated to God Almighty who made it possible to come to an end. Thanks be to God Almighty.

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Chapter 1 : Research Introduction

1.1 Introduction

This main thesis interest is to examine supply chain collaborations that lead to effective supply chain performance, particularly in the oil and gas industry. The researcher developed an interest in this study due to unclear issues that needed to be revealed as a way forward to improving supply chain performance in the oil and gas industry.

The essence of supply chain collaboration is to reduce lead time and enhance order fulfilment achieving a sufficient level of performance. The motivation behind a collaborative approach is its impact on the extent of profitability and sustainability of the organisation.

The challenges affecting supply chain performance in the oil and gas industry are lack of information sharing, costs, infrastructure, trust, risk and uncertainty, finance, and development of policy to ensure consistency.

1.2 Personal motivation

The researcher came from a country where 90% of its revenue generation is from the oil and gas industry, as well as heavily dependent on its operations as a source of income for its people. The researcher developed an interest in the sector as a means of survival. He began retail of this natural mineral product on a small scale as a career in a rural community in Nigeria, and he was concerned with the successful operations of the oil and gas industry supply chain that will enable smooth flows of products from producers to the markets and effective flow of information from the customers end to the producers. But the entire supply chain was never possible due to a lack of infrastructure and transportation systems which were part of the challenges. These challenges inhibit the trade of oil and gas products.

As a previous small-scale retailer, I was keen to contribute my knowledge and services to develop an adequate supply chain flow of oil and gas. Still, my efforts were unfulfilled due to a lack of enabling environment encompassing information sharing, communication channels, and policy and decision-making in the sector. There exists a dysfunction in the sector, which prompted the researcher to embark on academic studies to explore further the dysfunction of supply chain management in the oil and gas industry to make a positive impact to the body of Knowledge and industrial practice.

The researcher's decision to explore the supply chain collaboration in oil and gas was due to his prior experience as a marketer and as an expert in business coupled with his academic study in supply chain management. The researcher strongly believed that his academic contribution would help reveal the enablers and inhibitors of supply chain collaboration for effective performance improvement in the oil and gas industry.

Though, the academic interest of the researcher focuses on adopting supply chain collaboration to improve performance. The researcher reviewed professional articles and reports on the supply chain in the oil and gas industry, with focus of using supply chain collaboration to improve supply chain performance. The researcher reflected on the enablers and inhibitors of the supply chain collaboration in the oil and gas industry (the gap). The author proceeded with research based on the available evidence of a lack of information flow and an inadequate supply of oil and gas products due to a lack of infrastructure. This was supported by the literature the researcher had read on supply chain collaboration. Being strongly attracted by and interested in the supply chain performance of the oil and gas industry, the researcher embarks on a purposive study involving multiple stakeholders to examine further and offer a better understanding of the complexity of supply chain Management in the industry which supply chain collaboration was deemed as the key driver in achieving effective performance system.

1.3 Research Scope

To comprehend the linkages and how they contribute to a company's performance improvement, this study looked at supply chain collaboration trends and its performance in the oil and gas sector. This research also looks at the various supply chain collaboration models, structures, and procedures that increase supply chain performance in various sectors. However, the focus of this study aimed at identification of the key enablers and inhibitors of supply chain collaboration to evaluate how supply chain collaboration might be utilised to enhance the performance of the oil and gas industry's supply chain. The oil and gas industry are believed to perform better when there is effective supply chain collaboration model that will be created using the identified enablers and inhibitors of the supply chain.

1.4 Existing Supply Chain Collaboration Models

The literature review revealed several supply chain collaboration models from other industries, including the manufacturing, automotive, and apparel sectors. However, due to the complex and dynamic nature of the oil and gas sectors, these models were unable to adequately describe operations there. As a result, the research's author saw this as yet another gap in the literature and decided to create a new model using the identified enablers and inhibitors.

Some of the supply chain collaboration model reviewed are presented below:

Previous Models

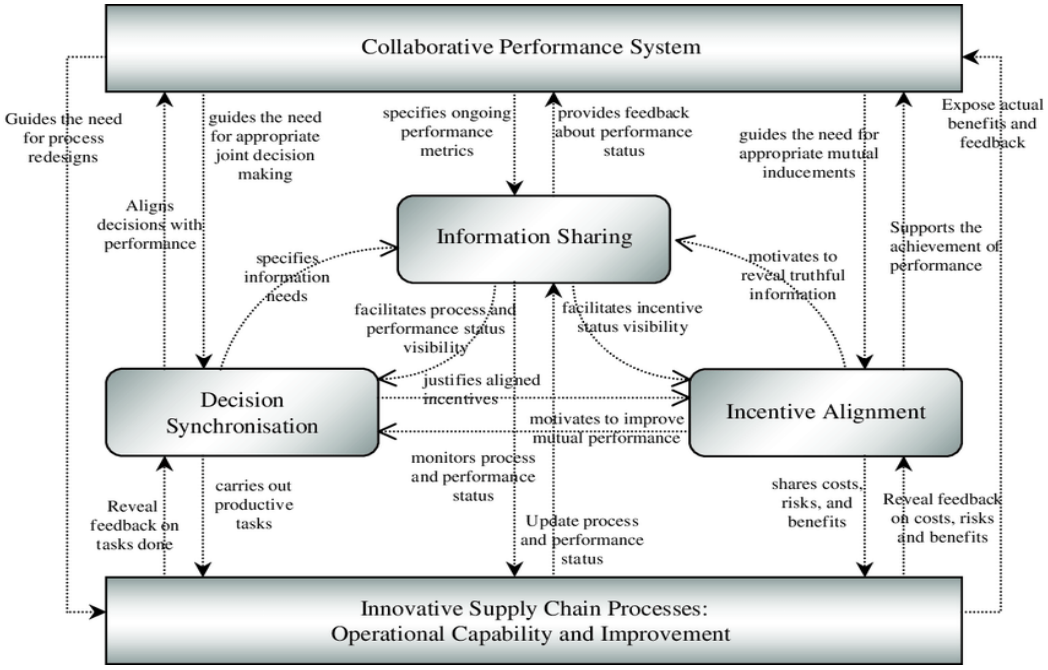

Figure 1-1: Design for supply chain collaboration
Source: Simatupang, T. M., & Sridharan, R. (2008)

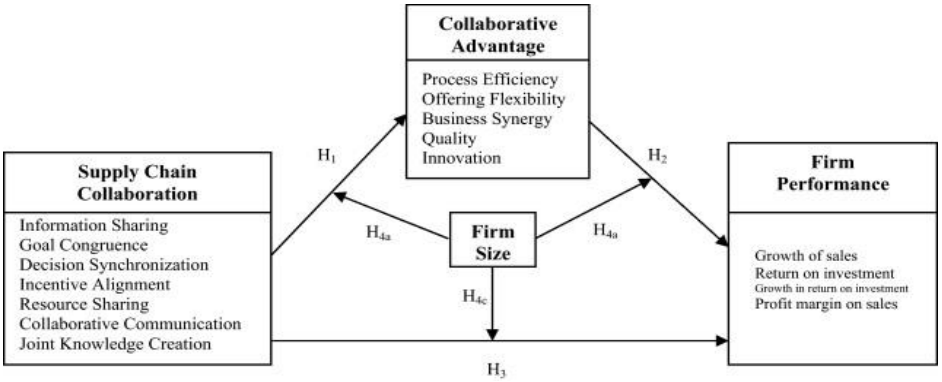

Figure 1-2: Supply chain collaboration: Impact on collaborative advantage and firm performance
Source: Cao, M. and Zhang, Q., (2011).

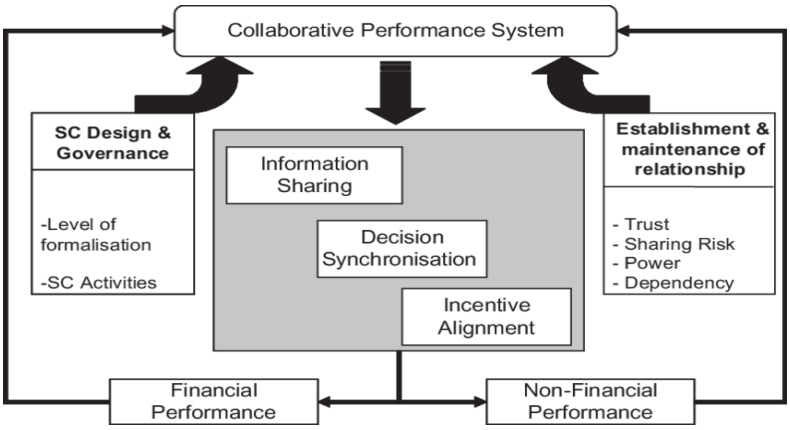

Figure 1-3: Framework for supply chain collaboration
Source: Naspetti & Lampkin et al, (2011).

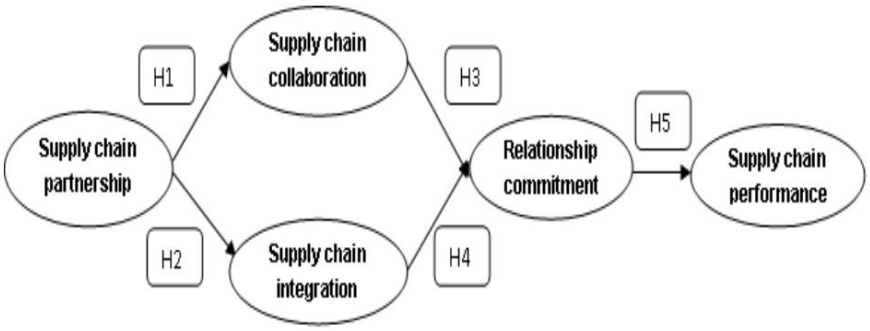

Figure 1-4: Supply Chain Partnership, Collaboration, Integration and Relationship Commitment As Predictors Of Supply Chain Performance In South African SMES

After reviewing the current models, the researcher developed a new model that is shown in figure 1.1 - figure 1.5 below and focuses on the utilisation of supply chain collaboration variables for performance enhancement in the oil and gas sector.

New Model

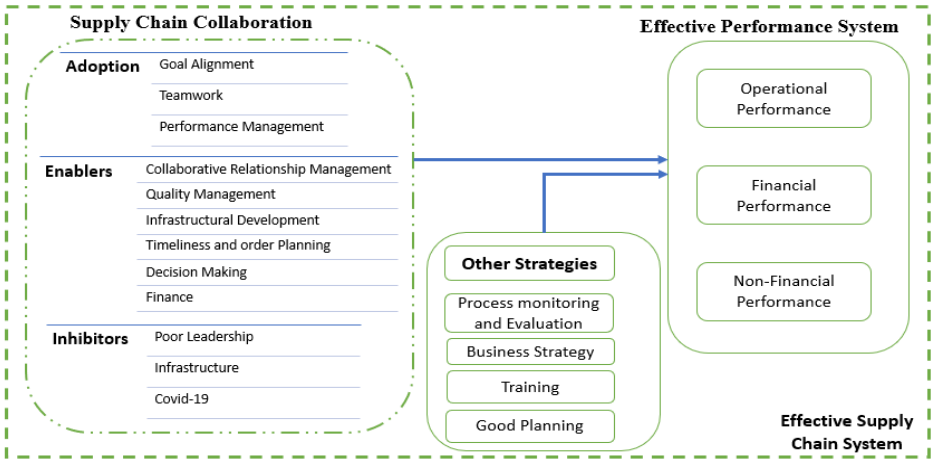

Figure 1-5: Model Development for Effective Supply Chain Collaboration leading to performance Improvement.

1.5 Research Significance and Gaps

The significance of this research is its contribution to the existing body of knowledge, industry and academic by identifying the key enablers and inhibitors to supply chain collaboration which if being effectively managed can lead to performance improvement. This research has developed an important model understanding supply chain collaboration and it was evidence that the identified components and factors presented in the model can help to improve supply chain performance in an effective and efficient manner.

The researcher reviewed professional articles and reports on the supply chain in the oil and gas industry, mainly looking at how supply chain collaboration tends to improve the entire performance of the industry. The researcher reflected on the enablers and inhibitors of the supply chain collaboration in the oil and gas industry. The author proceeded with research based on the available evidence of a lack of information flow and an inadequate supply of oil and gas products due to a lack of infrastructure and effective collaboration among the concern stakeholders. There are lesser academic publications as compared to other industry such as retails and automobile industry. Furthermore, supply chain collaboration articles country by country and as indicated in the chart below, Nigeria has insignificant publication as compared to other countries, for instance United States and United Kingdom. Also, the research gaps appear to be organisation uncertainties, infrastructure, and a lack of information flow in the system, which prompted the conduct of this research to understand the impact of the above mentioned on the oil and gas supply chain in Nigeria. **Appendix A** tabulates further on the literature gaps.

1.6 Research Aim and Objectives

The research aim is to develop a model for supply chain collaboration through uncovering the associated enablers and inhibitors in the oil and gas company for performance improvement.

- To investigate the existing supply chain collaboration and implementation process that contributes to performance improvement of the oil and gas industry.
- To explore the gaps that exists between the supply chain collaboration structure and implementation through the process of identifying the enablers and inhibitors of supply chain collaboration towards improving the oil and gas industry performance.
- To develop a supply chain collaboration model as a means of mitigating the research gaps.

1.7 Research Questions

This thesis identifies four research questions considering the impact of supply chain collaboration on supply chain performance in the oil and gas industry. By addressing these questions, a better understanding of supply chain collaboration will be obtained, and this will help to improve supply chain performance in a more effective and efficient manner. The four research questions are presented as follows:

Question 1. How can supply chain collaboration improve performance in the oil and gas industry?

Question 2. What are the enablers of supply chain collaboration leading to performance improvement in the oil and gas industry?

Question 3. What are the inhibitors of supply chain performance in the oil and gas industry?

Question 4: What are the key strategies utilised to enhance supply chain performance?

1.8 Research Contribution

This study presents a further novel contribution by creating a model that provides a more transparent representation of the supply chain collaboration in the oil and gas sector and identifies linkages between the components. It has shown that for an organisation to achieve performance improvement in their supply chain operations, the organisation has to consider the sixteen elements of this research outcome that leads to model development of supply chain collaboration in the oil and gas industry.

1.9 Thesis Structure

The research will be presented in chapters to enable the flow of ideas relevant to the reader. This chapter displays the layout and the plan for the study.

Chapter two will be a literature brief review on supply chain management, supply chain performance management with a detailed review on supply chain collaboration. The chapter will further review the study of the supply chain uncertainty in the oil and gas industry. Also, this chapter this seeks to review the critical theories in the management field, including network theory, transaction cost theory, systems theory, and resource dependence theory, which will serve as lenses for a better understanding of the study issues.

Chapter three presents the defence of the research methodology following the philosophy, approach, strategies, time horizon and data collection methods. This section also offers the issues with supply chain collaboration research ethics and its significance for performance improvement in the research context.

Chapter four presents the actual interviewees and companies used for the data collection and its procedures, transcribing, and pattern identifications. This chapter will further highlight the frequencies (percentage) of the interview findings and draw out interview model from the interview findings.

Chapter five presents the validation summary of the interview findings. Furthermore, validation procedures, interviewees, questions and transcribe were highlighted in this chapter. Furthermore, this chapter outlines the validation procedure of the study model development from the interviewee findings on supply chain collaboration leading to successful performance in the Nigerian oil and gas industry. In order to close the research gaps, a model was developed in this chapter.

Chapter Six presents the discussion and analysis drawn from the literature, theories support, Interview findings, validation on interview findings and model development of how supply chain collaboration will facilitate performance improvement in the oil and gas industry.

Chapter Seven presents the conclusion and reflection on the research journey and its contribution. This chapter will also draw limitations and recommend directions for future research. Finally, the study will present references and appendices, which signpost the conduct of the study.

1.10 Chapter Summary

This chapter presents the fundamental inspirations for the study of the adoption of supply chain collaboration to facilitate supply chain performance management in the oil and gas industry. This current section presents research aims, objectives, questions, rationale, and a systematic structure of the thesis.

The next chapter presents a literature review that identifies the gap, further informing and encouraging the researcher to pursue the study with enthusiasm.

Chapter 2 : Literature Review

2.1 Introduction

The content in this chapter presents a literature review on enhancing supply chain collaboration in the Nigerian oil and gas industry with a focal point on performance improvement. The primary purpose of this study is to understand the in-depth supply chain collaboration and its effects on supply chain performance improvement in Nigeria's oil and gas industry. The researcher further develops a research model from the literature review (see Figure 2-1) on how an effective supply chain system can contribute to the performance improvement of Nigeria's oil and gas industry. The researcher critically investigates several types of enablers and inhibitors as well as benefits of supply chain collaboration in an organisation, as indicated in Tables below. This research further identifies the crucial components, benefits, inhibitors, and enablers of supply chain management, as shown in figures below. The study further examines supply chain performance and its types, as highlighted in figures below.

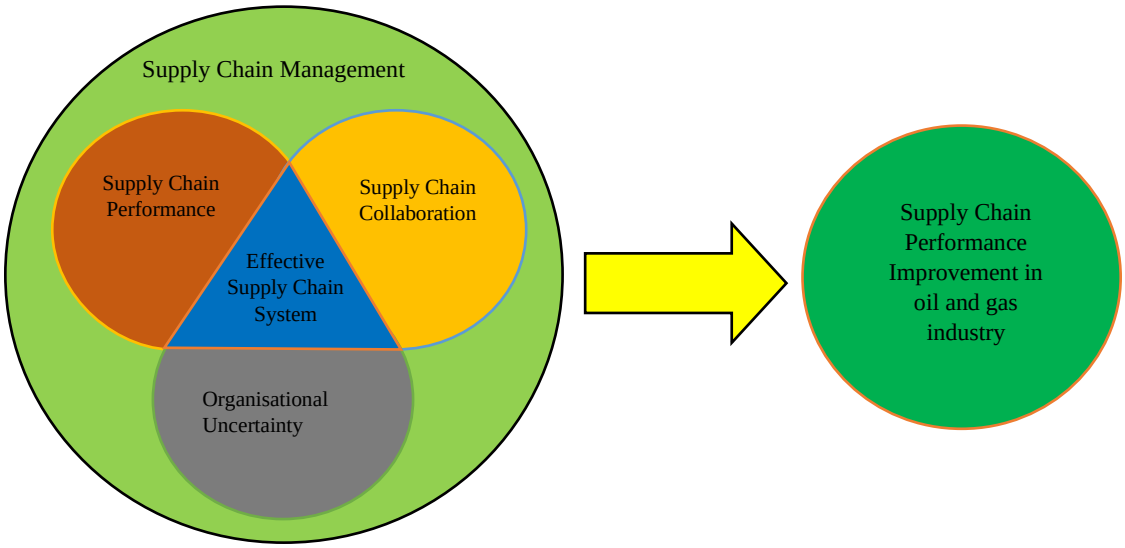

Figure 2-1: Research Review Direction

The supporting reason for conducting this research involving supply chain management, collaboration and performance is to understand the flow and processes undertaken to improve the performance of the supply chain in the oil and gas sector. An organisation in the supply chain can improve its performance when there are adequate processes such as materials sourcing, effective communication, efficient transportation systems, distribution channels and delivery of the products to the appropriate endpoints. These processes facilitate supply chain performance, which appears

to be affected by organisation uncertainties, infrastructure, and a lack of information flow in the system. On this basis, the researcher considered embarking on this research to examine supply chain management, collaboration, and performance to identify the gap hindering performance improvement in.

2.2 Literature Review Search

The relevant articles for this research on supply chain management, supply chain collaboration, supply chain performance and research methods were sourced from Scopus database which was one of the major databases for business, management, and engineering articles as well as recognised by the university of Strathclyde. Other databases like OnePetrol, Web of Science, Engineering Village and Google Scholar were also reviewed to see if there are any different publications that will come from them but at the end, all the resources collected were futured in Scopus database.

To guarantee the validity and applicability of the chosen research, the articles retrieved from databases for the literature review were subjected to several quality evaluation criteria, including:

Relevance to the research issue by checking to see whether the publication specifically addresses the research question or relevant issue. Make sure the study's goals are represented in the title, abstract, and keywords. By considering the ranking and standard of the journal or magazine where the work is published, one may determine the authenticity of the source. Peer review procedures are usually quite strict and academic standards are upheld by high-quality publications. Author Credentials are determined by carefully assessing the writers' backgrounds and areas of competence. Verify the individuals' associations, educational histories, and prior publications in the area. The credibility of the research is increased by authors with pertinent experience.

Research design and methodology looking at appropriateness and rigor of the study's design and methodology. Consider factors such as sample size, data collection methods, data analysis techniques, and whether the research design aligns with the study's objectives. Data collection and analysis ensure to assess the adequacy and reliability of the data collection process. Look for details on data sources, research instruments, and procedures used. Additionally, evaluate the clarity and appropriateness of the data analysis techniques employed. Validity and reliability by establishing the study internal and external validity. Internal validity refers to the study's ability to measure

what it intends to measure, while external validity relates to the generalisability of the findings. Assess the reliability of the study's results by examining the consistency of findings and the transparency of data and analysis.

Therefore, the research resolved to focus squarely on Scopus databased for the secondary data collection that are related to this research. The material selection was facilitated via Scopus by using essential keywords like supply chain collaboration, performance management, Nigeria, oil and gas industry, supply chain management theories, enablers of supply chain collaboration, inhibitors of supply chain collaboration and oil and gas industry to filter the published literature to arrive at the needed information. A structure Scopus literature search criteria such as subject areas (engineering and business management), Document type (articles, books, book reviews, and peer reviews), publication stage (final), Keywords (supply chain management, supply chain performance, supply chain collaboration, and oil and gas industry), source type (journals, books, and book series) and language (English) were selected to gather the relevant articles that related to this research context. Furthermore, some keywords were searched using close quotation mark and “AND” and “OR” gates. See Table 2-1and App.1 for more details.

Table 2-1: Procedure for Literature Review Search.

Keywords	**Database**	**Literature Search Criteria**							**Number of Articles**
		Subject Areas	Document Type	Publication stage	Keywords	Country/ Territory	Source Type	Language	
Supply chain performance AND Nigeria AND oil and Gas Industry AND supply chain collaboration	Scopus								0
Supply chain performance AND Nigeria AND oil and Gas Industry	Scopus								5
	Judgement	The 5 articles were read through, and the researcher gained knowledge on how supply chain performance works in the Nigeria oil and gas industry							
	Citation	Fazli-Khalaf et al. (2017)**;** Petersen et al. (2005)**;** Tserng et al. (2006)**;** Tung et al. (2020)**;** Zenkova et al. (2022). L. Chen et al. (2021); Gosling et al. (2016); Koronis and Ponis (2012); Lockström et al. (2010); Mokhtar et al. (2019)							
Supply chain performance AND oil and Gas Industry AND supply chain collaboration	Scopus								10
	Judgement	The 10 articles were read through, and the researcher gained knowledge on how supply chain performance works in the oil and gas industry generally.							
	Citation	Biswas and Das (2020); Cedillo-Campos et al. (2022); Gulyani (2001); Jadav et al. (2011); Svanberg and Halldórsson (2013), Cao and Zhang (2013); Duong and Chong (2020); Ramanathan (2014); Simatupang and Sridharan (2002); Singh et al. (2018)							
Supply Chain Collaboration OR Collaborative Supply Chain AND Oil and Gas Industry	Scopus								51
	Judgement	After carefully examining and carefully reading the whole 51 documents but none of the documents discusses supply chain collaboration as a supply chain management strategy for performance improvement in the oil and gas industry.							0
Supply chain collaboration AND oil and gas industry	Scopus								41
	Judgement	The 41 articles were carefully read, and 22 articles were finally selected that talked about supply chain collaboration in the oil and gas industry in general while non talks about oil and gas industry in developing country, more especially in Nigeria.							22
	Citation	Handfield and Pannesi (1995); Kaufman et al. (2000); Kessler and Chakrabarti (1996); Sengupta et al. (2006); Simatupang and Sridharan (2008)**,** Chung et al. (2008); Panahifar, Byrne, et al. (2015); Panahifar, Heavey, et al. (2015); Parung and Bititci (2006); Singh et al. (2018)							
Supply chain collaboration AND oil and gas industry AND Nigeria	Scopus								2
	Judgement	The two articles look at the collaboration between the government and other stakeholders but were not able to identify the adoption of supply chain collaboration leading to performance improvement in the oil and gas industry. Also, they fail to highlight the implementation process at the downstream sector of the Nigeria oil and gas industry. Lastly the enablers and inhibitors of supply chain collaboration leading to performance improvement in the industry was not highlighted.							
	Citation	Chao et al. (2013); Ellram (1991)							
Supply chain collaboration AND Model AND oil and gas industry	Scopus								0

The Table 2-1 highlights the procedures for literature reviews search and its justification for the selection of publications that related to the research contexts. Table 2-1 further detailed that there is limited publication for supply chain collaboration in the Nigeria oil and gas industry leading to performance improvement. Therefore, the researcher considered this as a gap in the literature publication on supply chain collaboration and supply chain performance. Appendix A further detailed the procedures for literature review search and their justifications as well as results.

2.3 Supply Chain Management

This literature section presents the definition of supply chain management and its effects on the operation of an organisation—the insight about the components of supply chain management, the enablers, and barriers to organisation performance.

Earlier studies in the field of supply chain management note that the term "supply chain management" was first proposed by management consultants in the early 1980s and that it has since received widespread and intense interest from researchers in various fields. Furthermore, Supply chain management was initially viewed as manufacturing and distribution logistics, including customers and suppliers. Recently, supply chain management has integrated all business processes across the supply chain network (Lambert & Cooper, 2000; Lamming et al., 2000; Yusuf et al., 2014).

Before going to the review, it is essential to understand the term supply chain management in different views presented by several authors to understand better how to approach this research. The research has identified various definitions of supply chain management from diversified disciplines. Supply chain management is a strategy for dealing with the overall flows and distribution of goods and services from the producers to the beneficiaries through logistics processes (Cooper et al., 1997). Vaaland and Heide (2007) state that supply chain management begins with organising and managing the flow of materials from the point of producers to consumers. It is a network that involves buyers, suppliers and stakeholders in transforming products and services in an organisation (Leising et al., 2018; Seuring & Müller, 2008). Mentzer et al. (2008) state that supply chain management has strategic integration of business activities and partners within the supply chain to enhance the performance and entire supply chain processes of an organisation. It consists of effective planning and controlling resources for smooth operation, which involves sourcing, procurement, inventory management and logistics management. These

can be achieved by effective coordination and collaboration between the suppliers and the customers in the supply chain network.

Moreover, Rani (2015) refers to supply chain management as integrating suppliers and order/demand management across the business. A recent study defined *supply chain management* as the operations/activities involved in the delivery of materials/products and services to beneficiaries; these include material procurement, production, inventory management, warehousing, order placement and management, distribution system and information flow (Lummus & Vokurka, 1999). Singh et al. (2018) stated that *supply chain management* is a mechanism for connecting organisations or companies with their suppliers, stakeholders, and customers. It also creates the bridge and collaborations for businesses to achieve their competitive advantages through practical and efficiently minimising operating costs and improving flexibility in customer satisfaction. These can be achieved through partnership and trust among the supply chain members. Bayode and Joseph (2014) state that supply chain management controls supplier, customer, and stakeholder relationships. The research focuses on upstream and downstream supply chain management to improve production values and reduce costs for every supply chain partner. An empirical study by Croxton et al. (2002) states that supply chain management incorporates essential business operations from suppliers to consumers, offering value-added products and improving the partners' services and information flow. Chen (2015) states that supply chain management controls customer relationships with upstream and downstream suppliers to provide outstanding values for the entire supply chain at a lower cost.

These definitions of supply chain management informed researchers on the focus and directions of supply chain management in dealing with the operations, cost reduction and customer satisfaction of most organisations operating supply chains.

The literature review indicates that supply chain management is also referred to as supply chain process and network. Supply chain management is a strong competitiveness and performance strategy for companies. In the last few decades, supply chain management has been an essential research area across sectors like retail, automobile, production, and manufacturing industries. However, numerous researchers have focused on supply chain management and contributed valuable empirical research that provides evidence towards improving supply chain processes. Research has shown that for effective supply chain management, the participating chain partners

must develop a cordial relationship to work together and share valuable information, rewards, and risks, which allows the members to achieve a competitive advantage and improve performance. The main goal of supply chain management in an organisation is to manage the processing, monitoring and transfer of materials through multiple functions and multiple levels of suppliers using an overall system approach (Mentzer et al., 2001; Monczka, Handfield, Giunipero, & Patterson, 2009; Monczka, Handfield, Giunipero, Patterson, et al., 2009) Singh et al. (2018) state that s*upply chain management* is continuously recognised to integrate core business operations in the supply chain. Recent research added that *"supply chain management"* explains how information, resources, and finance flow through various chain network stages (Rani, 2015).

The supply chain has become more significant in improving organisation performance due to global competitiveness, which is acceptable by creating new procedures that increase value efficiencies and customer loyalty (Hanga & Kovalchuk, 2019; Singh et al., 2018).

Effective supply chain management has become significant in resolving problems and supporting large, medium, and small-scale businesses in the long and short term to enhance organisational performance and achieve customer satisfaction. Furthermore, integrating supply chain partners eliminates all unwanted constraints and boosts the supply chain network. Therefore, supply chain management strives for collaboration and mutual integration between supply chain partners for an effective supply chain system (Lakshminarasimha, 2017). Lambert and Cooper (2000) stated that the control of customer demand uncertainty, production processes, and supplier performance is essential for effective supply chain management. Moreover, this study suggested that supply chain management involves multiple relationships between suppliers, customers, stakeholders, and other relevant partners, constituting a network chain in the system.

Supply chain management is a network strategy that connects across-enterprise business operations to achieve mutual market opportunities (Simatupang, 2007). It aims to optimise consumer loyalty and create a strategic advantage suitable for effective supply chain operations. Product creation, purchasing, and information exchange are crucial elements that help coordinate the organisational supply chain operations and are crucial for achieving efficient supply chain management (Lakshminarasimha, 2017).

Gunasekaran et al. (2001) identify the supply chain as a network system comprising a series of operations such as material supplies, production, distribution, and customer connectivity, which

effectively enables the flow of resources and information within the supply chain systems. Recent literature has shown that suppliers, manufacturers, distributors, retailers, and customers are connected in the supply chain processes. Therefore, some literature categorises the supply chain as a resource and information flow process throughout organisations, enabling decision-making (Chang, 2010; Chopra & Meindl, 2007).

The literature review revealed significant attention to supply chain management, including academic and practitioners' viewpoints. These contributions are notable in the information technology, manufacturing, construction, and service industries. Nevertheless, the significant development in the organisations' supply chains has faced global and local challenges, such as social and environmental challenges (e.g., population increase and climate change leading to flooding, pollution, food security, health issues and poverty). These challenges have impacted production and delivery in the supply chain system (Allaoui et al., 2019).

2.3.1 *Components of Supply Chain Management*

This section presents the 8 key components of supply chain management as it is applied in different subsectors of an organisation to support and improve its performance. Furthermore, Table 2-2 highlighted the eight components of supply chain management and their source.

Planning

Planning in supply chain management is one of the fundamental elements of supply chain and operations management, which has helped the organisation to achieve its targeted goal; it can be applied to different areas of study. For example, the research by Boyabatlı et al. (2019) states how planning has positively impacted the operation of farm practices and the effective distribution of farm produce. Another researcher agreed that planning has helped implement policies to address food supply-chain challenges (Livingston et al., 2014). The author of this research examined several kinds of literature on planning in the supply chain to acquire knowledge on how to improve the performance of the supply chain in the oil and gas sector.

Moreover, in project management, a plan presents vital items required for the successful execution of a project but is not a static or undisputable document. It is important to note that projects practically struggle with changes based on circumstances. However, some projects suffer more than others, and any significant changes in the project plan must be adequately recognised and

approval granted by the organisation (Koskela & Howell, 2002). The content of a project plan depends mainly on the nature, complexity, size, and type of the organisation handling the project.

Table 2-2: 8 Components of Supply chain Management

Components of Supply chain Management	**Citations**
Planning	Koskela and Howell (2002)
Information Flow	Carr and Kaynak (2007); Chen and Paulraj (2004)
Sourcing and Procurement	Handfield et al. (2011); Kim and Chai (2017b)
Inventory	Cachon and Fisher (2000); Sethi et al. (2005)
Production	Gupta and Starr (2014); Kumar and Suresh (2006)
Location	Bhatnagar and Sohal (2005); Melo et al. (2009)
Transportation	Chopra et al. (2021); Gregory and Bumb (2006); Lambert and Cooper (2000); Morris et al. (2013)
Delivery of Goods	Igwe et al. (2016); S. Xu et al. (2020)

Information Flow

Information flow is very significant in the day-to-day operation of organisations. Information flow is crucial for improving the performance of the organisation's supply chain because it makes available the basis and guide for effective decisions regarding operations and supply chain by directors. Several researchers identified the importance of information flow in the supply chain as it integrates with partners (Carr & Kaynak, 2007; Chen & Paulraj, 2004).

Sourcing and Procurement

Sourcing is also referred to as procurement by some authors; it selects suppliers based on set conditions to achieve business goals. One of the most efficient uses of sourcing in the supply chain is because it enables the acquisition of inputs or materials necessary for production. In most cases, organisations select appropriate suppliers to offer the lowest cost and deliver on time to enable the organisation to achieve its targeted outcome (Handfield et al., 2011; Kim & Chai, 2017a).

Suppliers play a crucial role in the supply chain by assisting organisations in achieving performance by satisfying their customers. The role of sourcing and procurement is to ensure that organisations obtain supplies at the lowest price possible. In addition, organisations gain advantages from using a multiple-sourcing strategy, which helps in cost reduction due to competition and ensures uninterrupted supplies when there are issues with some of the selected suppliers' ibid.

Inventory

Existing literature highlighted the role played by inventory management in the supply chain of different organisations, which include manufacturing, construction and production (Cachon & Fisher, 2000; Sethi et al., 2005). This help organisation prevents them from going out of stock and allows quick response to orders and fulfilment of customers' needs. Furthermore, it enables organisations to control the cost of operations effectively, and warehouse management enhances business by knowing exactly the input and output for proper decision-making and managing the supply chain, (Cachon & Fisher, 2000).

Production

Production is a vital aspect of the supply chain. To achieve the desired outcome, organisations need to consider production as an essential tool to facilitate their supply chain process. It is important to recognise that before the commencement of production, the organisation must plan its activities to procure all the needed materials and ensure inventories are well stocked, the maybe information or materials (Gupta & Starr, 2014). The main idea behind the production is to produce a product or service that attracts potential and authentic users to create demand. Production involves three primary activities such as sourcing for "inputs" and "transforming" them into "outputs" (Kumar & Suresh, 2006).

Location

Decisions about locating facilities in a supply chain are crucial because they ensure efficient delivery and order fulfilment, which is the primary goal of supply chain management. Location is significant in the day-to-day operation of the organisation's supply chain, business success can be determined by how accessible the customers can be, and it enables quality delivery of goods to customers (Melo et al., 2009). Therefore, supply chain management needs to adjust and improve all activities based on business location. Business location is a crucial component in an organisation's supply chain and can positively impact the efficiency of logistics activities and the business's general performance. The main emphasis of logistics is to minimise costs and improve efficiency and customer satisfaction (Bhatnagar & Sohal, 2005).

Transportation

Transportation is the movement of products across the supply chain cycle (i.e. from the point of origin to final users), according to Chopra et al. (2021). Therefore, transportation is crucial for the fulfilment of the supply chain. Transportation is one component that effectively facilitates the

supply of goods to customers (Lambert & Cooper, 2000). Whether goods are imported or produced locally, there are costs of transportation associated with the process of moving or distributing the products from one place to another, and the costs of transportation must be controlled to maximise profit. Researchers suggest that bulk ordering for materials or finished goods helps with cost reduction (Lambert & Cooper, 2000). However, the transport, handling, and storage costs contribute to the overall price of the product. Therefore, it is essential to save costs, which can be achieved by investing more in infrastructure development which will enable the effective distribution of the product from one place to another smoothly (Morris et al., 2013). The research conducted by Gregory and Bumb (2006) identifies the main components that facilitate the supply chain, which include effective transport systems leading to cost reduction in the distribution, improving the business environment and reducing risk and uncertainties causing delays in the supply chain. The literature suggests that cost reduction through all means of transportation of products can be achieved if the distribution system's entry point is well organised.

Delivery of goods

The delivery of goods can be considered the stage at which products and services an organisation supplies meet customer expectations. This component is important in supply chain management as it involves the measurement of performance right from the supplier end to the customer end. This determines whether an organisation is effectively satisfying its customers as required. The role of delivery in the supply chain is to enable the timely supply of goods to customers and in good quality (Igwe et al., 2016; X. Xu et al., 2020).

2.3.2 *Benefits of Supply Chain Management*

The benefits of supply chain management are to control and manage an organisational activity in a given project (L. J. Chen et al., 2017). Effective management results in inventory management, leading to cost reduction, efficient planning and production, quality product quality, and lead time management. In addition, other benefits of supply chain management in an organisation are; promoting collaborative partnerships, problem-solving, facilitating effective product flows, improving performance, gaining competitive advantages and improving communication by connecting partners (Carvajal-Arango et al., 2019; Stella, 2019).

Bayode and Joseph (2014) believe that effective supply chain management contributes to successful organisational performance improvements such as customer satisfaction and

profitability, lifetime value, quality delivery of products and services, and customer acquisition and retention in the supply chain network. Other researchers identified that the main goals of supply chain management include minimising operational costs, improving productivity, customer satisfaction, flexibility, timely delivery, and achieving a sustainable competitive advantage for the supply chain members (L. J. Chen et al., 2017). Consequently, Hassini et al. (2012) state that supply chain management improves business performance by controlling supply chain processes such as transactions and effectively using resources and information. Furthermore, other researchers are of the opinion that supply chain management enables the effective operation of business organisation in terms of information flow and inventory management, promotes trust and customer satisfaction through order fulfilment and maximises profit (Attaran, 2012; S. E. Fawcett et al., 2008; Heydari et al., 2019).

2.3.3 *Enablers of Supply chain management*

The existing literature identifies components and enablers of supply chain management, which promotes effective operations of the supply chain activities. The enablers also offer a guideline in order to optimise the operations. Although the literature has provided extensive evidence on the enablers of supply chain management for effective operations, which include effective planning and operation, minimising costs and maximising supply value (Angkiriwang et al., 2014; Barratt, 2004; Tyagi et al., 2015). This study will consider the importance of supply chain enablers to enhance the investigation of the supply chain performance improvement in the oil and gas supply chain.

Chakuu et al. (2019) further identify Information sharing, flexibility, trust, policy, and innovations as enablers for effective supply chain management. In addition, policy making, governmental support, leadership, strategic planning, customer demand, product availabilities, relationships management, supply chain processes, and commitment to environmental performance are classified as supply chain management enablers (Ali et al., 2018; Balasubramanian, 2014). Additionally, recent empirical publications noted that supply chain management in an organisation is enabled by quality management, information technology, top management involvement, on-time delivery, continuous development, customer satisfaction, information sharing, supply chain collaboration, performance evaluation, effective relationships, and mutual goals (Agrawal et al., 2020; Alsharif et al., 2019; Dube & Gawande, 2016; R. Dubey et al., 2015). Figure 2-2 below

provides a bar chart of the enablers of supply chain management that lead to an effective supply chain system.

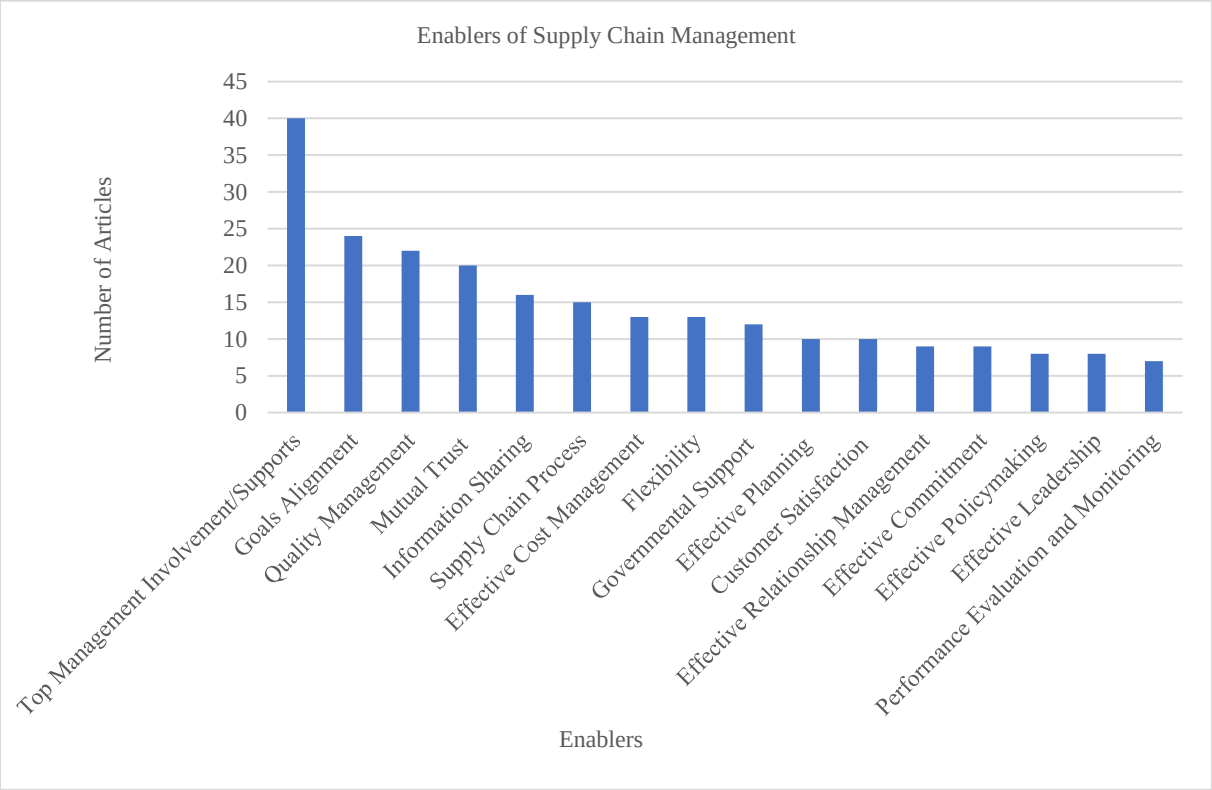

Figure 2-2: 16 Enablers of Supply Chain Management

Table 2-3: Sixteen Enablers of Supply Chain Management

S/No	Supply Chain Management Enablers	Citations
1	Top Management Involvement/Supports	Balasubramanian (2001)**;** Birasnav and Bienstock (2019)**;** Fawcett et al. (2006)**;** Jum'a and Kilani (2022)**;** Zhao et al. (2015)
2	Effective Policymaking	Chen and Wang (2016)**;** Croft et al. (2018)**;** Iakovou et al. (2012)**;** Qureshi et al. (2007)**;** Wang et al. (2020)
3	Effective Planning	Fazli-Khalaf et al. (2017)**;** Petersen et al. (2005)**;** Tserng et al. (2006)**;** Tung et al. (2020)**;** Zenkova et al. (2022)
4	Effective Cost Management	Claassen et al. (2008); Gao et al. (2022); Hsiao et al. (2010); Narasimhan and Das (1999); Sahin and Robinson Jr (2005)
5	Governmental support	Asgary et al. (2012); Logie and Harding (2005); Luthra et al. (2016); Narwane et al. (2021); Yu et al. (2022)
6	Effective leadership	L. Chen et al. (2021); Gosling et al. (2016); Koronis and Ponis (2012); Lockström et al. (2010); Mokhtar et al. (2019)

7	Effective relationship management	Alonso-Muñoz et al. (2021); Collins (2009); Fayezi et al. (2017); Lee et al. (2013); Perrin and Pervan (2005)
8	Information Sharing	Cai et al. (2022); X. Chen et al. (2021); Lee et al. (2000); Nyaga et al. (2010); Prajogo and Olhager (2012)
9	Customer satisfaction	Agrawal et al. (2020); Chalyvidis et al. (2013); Min (2015); Reichheld (2009); van der Vorst (2000)
10	Performance evaluation and monitoring	Aksoy and Öztürk (2011); Hudnurkar et al. (2014); Hwang et al. (2008); Olugu and Wong (2012); Samaranayake and Laosirihongthong (2016)
11	Goals Alignment	Albishri et al. (2020); Cao et al. (2010); Fargnoli et al. (2022); Gabler et al. (2017); Moon et al. (2002)
12	Effective Commitment	Bahinipati and Panigrahi (2018); Lee (1995); Panahifar, Byrne, et al. (2015); Sooriyamudalige et al. (2020); Stultz et al. (2003)
13	Supply chain process	Corallo et al. (2020); Hertz et al. (2001); Kimsey (2010); Pradabwong et al. (2017); Zhu et al. (2012)
14	Quality Management	S. Chen et al. (2017); Rameshwar Dubey et al. (2015); Flynn and Flynn (2005); Kitazawa and Sarkis (2000); Tann et al. (2005)
15	Mutual Trust	Baah et al. (2022); Carvalho et al. (2021); Claro and De Oliveira Claro (2004); Jermsittiparsert and Pithuk (2019); Laaksonen et al. (2009)
16	Flexibility	Bai et al. (2020); Esmaeilikia et al. (2016); Gong (2008); Lummus et al. (2003); Singh and Acharya (2013)

Top management involvement/supports.

The involvement of the top management of an organisation has been identified as one of the crucial enablers of supply chain management that enables the supply chain partners to achieve an effective performance system in the organisation's supply chain process (Fawcett et al., 2006; Gao et al., 2021; Govindan et al., 2010; Muduli et al., 2020; Srivastava et al., 2022; Wong et al., 2012). In the manufacturing sector, Wang et al. (2010) point out that top-level management supports internal and external organisational activities to ascertain how radio frequency identification will be widely adopted to increase supply chain transparency and operational efficacy through technological advancements and collaboration. Another study added that top management support is one element that significantly influences the choice to implement Internet-based inter-organisational information systems in business/supply chain channels (Soliman & Janz, 2004). The top management involvement in the supply chain activities is more likely to embrace electronic supply chain management to improve technological innovation and advancement to provide sustainable business in Taiwan (Lin, 2014). Supply chain uncertainty of an organisation was reduced through

strategic measures like contingency planning, with the collaboration of top management to improve supply chain flexibility and transparency (Skipper & Hanna, 2009).

Furthermore, Skipper and Hanna (2009) added that the involvement of an organisation's top management contributes to the increase in customer satisfaction and the overall performance improvement of the focal firms (Sroufe & Curkovic, 2008). In order to achieve effective collaboration, improved performance, and responsiveness to customers' demands. An organisation's supply chain management process requires managerial dedication within and outside the organisational functions to achieve its targeted goals (Alaskar et al., 2021; Wong et al., 2012). To properly consider corporate strategy with supply chain strategy and business operations, top management must provide complete corporation for the internal communication unit to manage the supply chain process flow effectively. This includes making themselves easily accessible, acting as role models for effective communication, and anticipating that every other manager throughout the organisation will be able to convey their ideas effectively to other employees and stakeholders. Furthermore, to achieve improved organisational performance, there is a need for frequent alignment of processes, including communication between the top-level management and staff members. Therefore, managers and Leaders who pay attention to and listen to employees are more likely to implement effective organisational change and achieve an effective supply chain system.

Effective policymaking

Effective policymaking is another key enabler of supply chain management identified from the literature review. Policymaking was highlighted in the review as a medium to facilitate information sharing and decision-making among the supply chain partners for effective organisational performance systems (Delavar et al., 2022). An effective policy was one of the factors utilised in establishing "a Methodological Framework for Integrating Waste Biomass into a Portfolio of Thermal Energy Production Systems" (Iakovou et al., 2012). According to past studies, policymakers support effective programmes for lowering carbon emissions (Chen & Wang, 2016). Furthermore, a tax deduction policy is more effective than a subsidy system for supporting energy-efficient industries competing with similar manufacturers (Safarzadeh & Rasti-Barzoki, 2019). Through the participation of local governments in the process of circular policymaking, suggestions were established to improve the environmental performance of corporations

(Kazancoglu et al., 2021). Sustainable development goals related to global food waste have inspired the proposal of a national food waste management strategy for Bangladesh which focuses on effective policy and sustainability (Ananno et al., 2021). The demands and dangers involved in producing agricultural commodities for a worldwide market must be addressed for effective policy interventions in global trade flows (Croft et al., 2018).

Effective Planning

Effective planning enables the supply chain partners to manage their logistic operations effectively, such as delivering the company's products on time to their clients. It also provides smooth operations during the supply chain operations in an organisation. Petersen et al. (2005) noted that effective planning allows the supply chain stakeholders to collaborate effectively and improve the performance of their supply chain network. It also provides visibility, effective operation control, material tracking, monitoring and evaluation, and manages information flow in projects and supply chain networks (Shahi et al., 2012). Supply chain partners implement innovative technologies like blockchain to boost supply chain operations and resource deployments and provide customer satisfaction (Marbouh et al., 2020). Inadequate planning could result in a lack of supplies, preventing the project's timeline from being pushed back. It could also lead to a significant rise in inventory costs due to the requirement to produce or supply items earlier than required at the designed locations (Tserng et al., 2006). Effective planning eliminates significant losses and strengthens the dependability of managerial judgments against uncertainty (Fazli-Khalaf et al., 2017). Supply networks for high-tech products are becoming increasingly complicated, and customers have higher expectations for the efficiency of these chains. As a result, accurate demand projections for individual components are crucial to running an efficient business (Yelland, 2010). In the context of efficiently planning activities to combat the coronavirus pandemic, cutting-edge technologies such as blockchain have the potential to play a vital role (Surakhi & Alkhanafseh, 2021). Also, Product deficits originate from poor planning and supply chain uncertainties (Zenkova et al., 2022). Effective planning allows the relevant stakeholders to decommission irrelevant activities in the oil sector, which leads to cost reduction of oil and gas products (Tung et al., 2020). The success of a building project relies on careful preparation of the production schedule and the planning of the supply chain processes involved in the supply chain operations to achieve adequate performance. Partners in the supply chain can save costs, increase reliability, enhance mutual goals, and adapt to changing conditions through effective planning.

Effective cost management

The researcher of this study identified effective cost management from the literature as one of the essential enablers of supply chain management that leads to performance improvement (Giunipero et al., 2006). Effective cost management is among the many factors that drive reverse logistics in an organisation (Kannan et al., 2009). Prior research has shown that to reap the full benefits of cost reduction, the focal company must have close relationships with all the companies in their supply chain network (Spekman et al., 1998). The findings of an earlier study noted that a decrease in costs is associated with switching from a conventional supply chain to a fully integrated supply chain system (Sahin & Robinson Jr, 2005). Additionally, when holding costs and demand variation are high, the possibility for cost reduction increases (Miranda & Garrido, 2004). The ability to quickly adapt to changing circumstances in an organisation and marketplace has been proven by researchers to have a significant impact on reducing production costs (Narasimhan & Das, 1999). It is also one of the four fundamental components of business value that leads to performance improvement of the focal company (Park et al., 2010). Traditional supply chains are becoming more intelligent, and as a result, the new innovative supply chain has great promise for reducing costs and increasing productivity during supply chain operations (Wu et al., 2016). In addition, satisfying consumers' expectations on time will cut costs and improve service as traditional supply chains become more sophisticated (Farahani & Elahipanah, 2008). Surprisingly, adequate cost savings can often be accomplished through the supply chain by boosting the total inventory levels of an organisation (Grahovac & Chakravarty, 2001). According to the findings of Ro et al. (2007), modularity initiatives appear to be solely cost-reduction focused. Another study identified that effective cost management is used to carry out a successful vendor-managed inventory which contributes to improved organisational performance (Claassen et al., 2008). However, the majority of studies on logistics outsourcing have focused on efficient cost management (Hsiao et al., 2009). The empirical investigation carried out by Gao et al. (2022), has demonstrated how vital information regarding product loss is for the efficient control of costs. In conclusion, Yang and Cui (2022) research found that efficient cost management significantly boosted the overall performance of a company's supply chain processes.

Governmental support

As an enabler of supply chain management, government support has allowed supply chain partners to fully utilise their potential through infrastructural development, government incentives, and tax

exceptions. It also provides a platform for effective communication among the partners, other stakeholders, and governmental bodies, which leads to supply chain sustainability and performance improvement. Denmark's biggest food waste reduction projects have been sponsored by civil society organisations and the government of Denmark (Halloran et al., 2014). Government incentives influence logistics companies' adoption of radio-frequency identification technology, according to Lin and Ho (2009). Previous research suggests that even minimal support from the government and non-governmental organisations can improve the rate, quality, and long-term viability of small enterprises' catastrophe recovery in Pakistan (Asgary et al., 2012). Downstream Chinese enterprises are more proficient and successful with organisational and governmental support, leading to green supply chain practices (Kuei et al., 2015). The Ugandan initiative is an excellent example of how government backing can be used to facilitate opioid roll-out throughout health districts (Logie & Harding, 2005). By introducing an additional layer of supplier transparency, the presence of governmental support lowers the likelihood of corporate social responsibility violations (Perry, 2012). Industrial Investment and government support have made it possible for the automotive industry to move quickly in this digital revolution (Yu et al., 2022). Governmental support from Narwane et al. (2021), impacts India's biofuels business's sustainability. Government assistance has a direct and favourable impact on information sharing, collaborative planning and, lastly, on the effective performance system of an organisation (Cai et al., 2010). According to past results, Government support and policies are the essential hurdles to adopting Sustainable consumption and production activities in supply chain operations (Luthra et al., 2016). To fully achieve hydrogen's potential across all economic sectors, recent research suggested a need to increase government support in conjunction with the business and academic sectors (Brandon & Kurban, 2017).

Effective leadership

Effective leadership is another enabler of supply chain management identified from the literature review. This enabler has enabled the supply chain partners to achieve a sustainable supply chain system and contribute to an organisation's performance improvement (Defee et al., 2009; Gosling et al., 2017). Leadership in the supply chain helps create a strategy for gaining a market advantage and speeds up the revolution to a customer-centric focus (Defee et al., 2009). According to a prior study, supply chain leadership enable supply chain partners to influence supply chain structure and learning, and significant businesses modify their supply chain structures to support supply chain

operations (Jia et al., 2019). According to the literature review findings, supply chain leadership is favourably associated with company success. More precisely, transformational supply chain leadership significantly influences firm performance more substantially than traditional supply chain leadership (L. Chen et al., 2021). Mokhtar et al. (2019) delved into how different Supply Chain Leadership approaches affect different metrics of supplier performance concerning reversing product flows to overall performance. Furthermore, the absence of effective leadership contributes to the misalignment of operational and strategic objectives, unsuitable alliance formation and ineffective performance systems among the supply chain partners (Yuen & Thai, 2017). On the other hand, effective relationships among the chain members improve their relationships and allow them to make effective decisions and develop new ideas. Koronis and Ponis (2012), further claim that effective leadership enables an organisation's top management to restore calm and stability during supply-chain crises and uncertainties. In addition, effective leadership enhances performance by influencing other total quality management practices (Koronis & Ponis, 2012). Nevertheless, a company's leadership and culture must be effectively managed for total quality management to be successful.

Effective relationship management

The literature review indicates that effective relationship management is another vital enabler of supply chain management that aids the improvement of organisational performance and culture. It also improves communication and builds trust among the supply chain partners. The relationships between the buyer, manufacturer and supplier allow them to effectively manage the information flow from one point to another for timely delivery and customer satisfaction. Fayezi et al. (2017) contended that good relationship integration with important partners mitigates control dissipation, which hinders scholarly comprehension of agile and adaptable supply chains. Giannakis et al. (2012) emphasise the significance of social and institutional control methods for effective relationships with Chinese suppliers. Effective relationships are the driving force behind sustainable supply chain management since they are the foundation for sharing information, resolving conflicts, and collaborating on new ideas among supply chain stakeholders (Giannakis et al., 2012). Furthermore, establishing a deep and successful relationship with customers and suppliers creates competitive value (Alonso-Muñoz et al., 2021; Lee et al., 2013). Cross-compliance with supply chain management and excellent relationships among supply chain participants can help them achieve successful quality management and improve the final

customer's quality, satisfaction, and profitability (Apornak & Hezaveh, 2019). According to a previous study, instructors of quantitative courses might benefit from encouraging their students to interact with one another outside of the classroom when the stressful environment is less likely to be a factor (Johnson & Kelly, 2020). The efficiency of the performance measuring system is enhanced by a successful relationship in supply chain operations and when developing business projects (Perrin & Pervan, 2005). In addition, Firms with particular talents are more likely to develop effective relationships with other competent partners, access incomparable resources, and attain a competitive advantage in a volatile environment (Madadi et al., 2022). Above all, effective relationship management allows the supply chain partners to develop trust among themselves and make an effective decision for supply chain sustainability and processes.

Information Sharing

The research of this study has identified that information sharing is an essential enabler of supply chain management (Islam, 2017; Li et al., 2005; Nyaga et al., 2010). Recent analysis implies that demand information sharing can be valuable, especially when demand is connected over time. As a result, many businesses have begun collaborating on projects allowing retailers and their upstream suppliers to share more information about customer demand (Lee et al., 2000). Another author added that information sharing significantly impacts Logistical integration (Li & Lin, 2006; Prajogo & Olhager, 2012). Nyaga et al. (2010) found that information sharing builds trust and commitment among the supply chain partners for effective data distribution in supply chain processes. According to prior research, suppliers work to protect their assets related to individual transactions through information sharing and cooperative relationships. At the same time, potential buyers place more emphasis on the outcomes of those relationships (Nyaga et al., 2010). Gao et al. (2022) examined how the loss of products in online commerce affects supply chain performance when sharing information. When there is a more significant amount of information exchanged, it makes a good supply chain practice more crucial. Therefore, effective information sharing, and supply chain management are essential to achieving strong supply chain performance.

Customer satisfaction

According to earlier studies, the customer is considered the essential stakeholder in the supply chain process in every industry. Therefore, it is crucial to take all essential steps to guarantee their contentment. Additionally, businesses must prioritise customer satisfaction (Agrawal et al., 2020).

An empirical study by Yu et al. (2013) focuses on customer satisfaction to shed light on the importance of supply chain integration and its effect on financial outcomes. Supply chain integration boosts customer performance, boosting the efficiency of all parties involved in the supply chain. Marketers and consumer researchers prioritise customer satisfaction and happiness among the core stakeholders of every business. Also, companies who care about their consumers and strive to please them gain customer loyalty. As the benefits of increased customer loyalty become more widely acknowledged, ensuring customer satisfaction has emerged as a critical business priority (Reichheld, 2009; Yu et al., 2013). Furthermore, The degree of customer satisfaction and a company's financial success is related in a positive way (Yu et al., 2013). Client loyalty increases comparable transactions and learning of supply chain organisation. Therefore, A deeper understanding of consumer needs leads to higher customer satisfaction and loyalty.

Performance evaluation and monitoring

Supply chain performance review and monitoring helped supply chain partners to establish and sustain customer-supplier relationships (Talluri & Sarkis, 2002). Utilising a holistic structure approach, integrating major supply chain activities allows real-time information integration for performance evaluation and monitoring in complicated supply chain contexts (Samaranayake & Laosirihongthong, 2016). The literature review identified performance measurements as an essential component of supply chain operations. These systems evaluate and monitor a variety of metrics relating to a wide variety of processes and functions to present an accurate picture of the supply chain operations. Supply chain performance evaluation problems in a supply chain operation are difficult to handle since they include many stakeholders and entities. Data Envelopment Analysis has been introduced by the expertise and research to compare how well organisations are doing in a given supply chain network (Tavana et al., 2013). Through performance review and monitoring, the performance of plastic recycling firms in Iran's Mazandaran and Golestan regions was enhanced (Jifroudi et al., 2020). Performance evaluation and monitoring allow the concerned partners of supply chains to assess their supply chain processes and implementation effectively and set a benchmark to meet the targeted and collaborative goals.

Effective commitment

The study of Sooriyamudalige et al. (2020) study identified effective commitment to supply chain practice as one of the industrial critical success factors, a prerequisite for an effective supply chain system. Furthermore, the absence of effective commitment in a given supply chain operation significantly impacts information sharing, supply chain finance initiative, and communication among the supply chain members (Garg & Kashav, 2022; Panahifar, Heavey, et al., 2015; Sooriyamudalige et al., 2020). The effective commitment of an organisation's top management contributes to the sustainability of the supply chain system and effective supply chain operation, as well as improving the overall performance system. It also allows the partners to be creative in developing business ideas and strategies that best suit the organisational operations, leading to performance improvement. To withstand international competition and stakeholder pressure, Indian small and medium-sized businesses must adopt and support sustainability policies, comply with relevant governmental legislation, and match their short- and long-term strategic goals with the effective commitment of senior management (Bahinipati & Panigrahi, 2018). Furthermore, the capacity commitment enables the supply chain manufacturer to produce delivery information through order projections from the customers effectively. Prior scholars confirmed that employee dedication is boosted by a company with a solid commitment to social responsibility, which in turn helps the company thrive and survive (Perry & Towers, 2013). Perry & Towers also highlighted that effective commitment influences the relationships between the buyers and suppliers of an organisation. It has been determined that strengthening commitment is crucial to the success of any total quality management implementation (Lee, 1995).

Goal Alignment

One of the critical pillars of using supply chain collaboration to improve organisational performance is goal alignment between the participating partners (buyer, customer, companies, and suppliers). Goal congruence in a supply chain occurs when all parties are certain that their objectives will be satisfied if the group succeeds in achieving the overall goals (Ma et al., 2021). The unique incentive system might help partners align their goals to improve performance through supply chain collaboration. Collaborative supply chain partners benefit from goal alignment because it gives them a broader perspective and makes it easier to reach a consensus. Similarly, it is easier to establish trust and commitment between the chain members, which have traditionally been perceived as the basis of supply chain relationships (J. Zhang et al., 2021). The study by C. Zhang et al. (2021) added that goal alignment among the chain members reduces opportunism

incentives during a collaborative supply chain. In addition, it facilitates collaborative communication among the participants by increasing mutual understanding.

Goal alignment helps partners to achieve a unified purpose and targeted goal. It also boosts competitiveness by facilitating information and resource sharing among the participants. The concept of "goal alignment" refers to a situation in which the objectives of many parties are in synchronisation. Given that all nodes must validate new information and current records' truthfulness in order to work together, blockchain is based on a principle of goal alignment. For this reason, blockchain promotes and supports the cause of goal alignment by preventing opportunistic control over the distributed ledge (Rejeb et al., 2021).

Supply chain process

Process management involves taking a proactive approach to quality control, such as establishing reliable procedures that provide steady production plans and scheduling to reduce process variation by incorporating quality into the product across the manufacturing phase. Reducing process variation should promote output uniformity and reduce rework and waste by quickly identifying and correcting quality concerns (Kaynak, 2003). The study of Rai et al. (2006), Wu et al. (2006) and Zhu et al. (2012) imply that integrated information technology infrastructures and radio frequency identification help organisations consolidate supply chain processes. The prior article demonstrated that advanced ISO 9000 and supportive implementation were associated with process management in the supply chain network (Prajogo et al., 2012). Effective process management minimises the waste of supply chain resources and improves customer values (Kimsey, 2010). Given that it provides both data and a framework for enhancing processes, it can be seen as a synthesis of past enhancement methods. Furthermore, it enhances organisational performance by adopting a process view of the supply chain businesses (Pradabwong et al., 2017).

Quality Management

Total quality management is a holistic management philosophy that seeks continual improvement in all aspects of a business, from resource procurement to after-sale customer support (Kaynak, 2003). According to Kitazawa and Sarkis (2000) and R. Dubey et al. (2015) total quality management application reduces waste. In addition, earlier research in the hospitality sector has established a connection between quality and environmental management, proposing that the adoption of quality management approaches facilitates the growth of expertise and improves the

overall performance of the hospitality industry. Therefore, the relationship between quality and environmental management maturity influences green supply chain management methods and performance. A recent article added further weight to this claim by stating that businesses that adopted complete quality management had better results in environmental sustainability. Furthermore, total Quality Management practices such as top-level management support, effective leadership, training development, and employee engagement impact the leading Total Quality Management strategy, which includes quality data and reporting, supplier quality management, product/service design, and process management (Kaynak, 2003). Therefore, changing an organisation's culture is nearly impossible without a dedicated effort by management targeted at continuous improvement, open communication, and cooperation throughout the supply chain processes.

Mutual Trust

The previous study has demonstrated that trust is the most significant antecedent of supply chain quality strategies and their outcomes (Al-Abdallah et al., 2014). Trust among supply chain partners can help to reduce expenditures, anxiety, and organisational uncertainty, as well as prevent opportunistic conduct. In terms of trustworthiness, good faith, generosity, and obligation fulfilment, trust is the degree to which external and focal partners strengthen their relationships (Kim et al., 2018). It is defined as stakeholders' honesty and commitment when they follow transaction standards and maintain positive attitudes and behaviours (Wei et al., 2012). Trust and honesty between the collaborative supply chain participants will lead to perfect supply chain unification (Oguche, 2018). Respect, honesty, trustworthiness, and mutual understanding are required for effective knowledge and information sharing, as well as collaboration in sharing risk and profit (de Almeida et al., 2015). The crucial factors for organisational success were absolute honesty and open communication, which are part of mutual trust that leads to an effective performance system (de Almeida et al., 2015).

Flexibility

The ability of a corporation to adjust to change is referred to as flexibility. Flexibility in industrial operations involves the greater capacity to respond to product changes in customer demands in the marketplace and competitive constraints (Elrod et al., 2013; Esmaeilikia et al., 2016). Elrod et al. (2013) further added that the quicker a company adjusts to marketing and customer change, the

more opportunity it has to profit from product and service demand (Manders et al., 2017). Flexibility aids the supply chain members to have the capability of performing many tasks in the supply chain processes in order to meet up with the customers' demands as well as make sure that customer satisfaction is met. It also allows an organisation to expand its operations and make adequate plans based on market trends and forecasts. In addition, flexibility in the supply chain aids the organisation to effectively organise adequate delivery to their customers on time, positively impacting collaborative relationships and effective communication.

2.3.4 *Inhibitors of Supply Chain Management*

This section presents the factors inhibiting the effective operations of the supply chain in organisations, including the oil and gas industry. The literature revealed that factors inhibiting effective supply chain management in an organisation include a lack of inventory management process, inadequate transportation systems, lack of information sharing, poor forecasting and ineffective government policies (Barratt, 2004). Other researchers, in their various studies, identified supply chain barriers in organisations to include ineffective logistics, distribution networks, lack of traceability and storage facilities, ineffective supply chain technology, inadequate packaging, market complexity and infrastructures (Boudahri et al., 2011; Priefer et al., 2016; Singhry et al., 2015). However, some researcher's literature revealed that lack of collaboration is another factor impacting negatively on the operations of the supply chain due to the lack of close relationships between partners in the supply chain, which also affects effective decision-making and performance improvement in an organisation (Beulens et al., 2005; Hobbs & Young, 2000).

Another empirical study highlighted "market size", inadequate government assistance, poor technological system, poor communication and ineffective supply chain professionals are considered inhibitors of supply chain management in an organisation (S. E. Fawcett et al., 2008; Gopal & Thakkar, 2016; Luthra et al., 2011; Tatoglu et al., 2016). Panahifar, Heavey, et al. (2015) identified several challenges to the implementation of supply chain management in an organisation, including the lack of mutual goals, poor demand variability, lack of commitment, lack of capacity development, inadequate funds, a lack of partner trust, ineffective top management support, a lack of real-time coordination and planning, poor information sharing, and inadequate information technology and expertise. Panahifar, Heavey, et al. (2015) added that if the identified

barriers are not carefully managed, the proposed collaborative planning, forecast and replenishment framework will not work as expected. Also, the decision-makers would be assisted in setting priorities for adopting supply chain management practices by assessing the priority level of these identified inhibitors. The study of Bahinipati and Panigrahi (2018) added that poor strategic orientation and supply chain implementation processes inhibit effective performance systems in an organisation. In addition, Table 2-3 points out the eight notable barriers to supply chain management and their source from the literature review.

Table 2-4: The Eight Barriers to Supply Chain Management

S/No	Barriers To Supply Chain Management	Citation
1.	Inadequate Governmental Facilities	Agarwal et al. (2016)**;** Aravindaraj and Rajan Chinna (2022)**;** Elbarkouky and Abdelazeem (2013)**;** Kormych et al. (2019)**;** Suyo et al. (2021)
2.	Ineffective inventory management	Jaeger et al. (2021)**;** Kamble et al. (2015)**;** Karamshetty et al. (2022)**;** Mansoor (2013)**;** Tripathi and Talukder (2020)
3.	Inadequate transportation systems	Biswas and Das (2020); Cedillo-Campos et al. (2022); Gulyani (2001); Jadav et al. (2011); Svanberg and Halldórsson (2013)
4.	Lack of information sharing	Abdulsalam and Schneller (2021); Deng et al. (2016); Khan et al. (2012); Shaw et al. (2003); Vora et al. (2022)
5.	Poor forecasting	Albertson and Aylen (2003); Cheng et al. (2006); Costantino et al. (2014); Hosoda and Disney (2009); Quarshie et al. (2021).
6.	Inadequate Policy	Amini et al. (2012); Chaka et al. (2016); Colautti et al. (2009); Jose and Bhaskar (2015); Kuteyi and Winkler (2022)
7.	Ineffective Cost Management	Agarwal et al. (2016); Happonen and Salmela (2009); Jayaram and Sankaranarayanasamy (2009); Luthra et al. (2011); Rathnasiri et al. (2022)
8.	Lack of quality management	Boudi et al. (2016); Chien et al. (2020); Obeth and Dunne (2008); Paillin et al. (2022)

Inadequate Governmental Facilities

As the government sets environmental and operational laws and policies for industry, it can stimulate or discourage creative supply chain operations. Smaller enterprises may be discouraged by time-consuming regulations, policies, fees, or taxes. Tax regimes can distort incentives, preventing businesses from implementing environmentally friendly supply chain management. Government institutions are impediments to environmental management growth since the

government and relevant stakeholders are implementing green supply chain management, but they offer little support for innovative ideas. As a result, the absence of government support mechanisms is a barrier to the successful implementation of effective green supply chain management in the supply chain industry (Kumar et al., 2021; Luthra et al., 2011; Scupola, 2003).

According to Kumar et al. (2021) research, a lack of government support and incentives is a significant barrier to implementing Industry 4.0 and the circular economy of agriculture supply chain models. Recent research added that the lack of government facilities has negatively influenced the framework for a circular economy that enhanced the environmental management of the apparel firms in turkey (Kazancoglu et al., 2021). Sun et al. (2020) investigation showed that a lack of government assistance is a barrier to modular building adoption. A recent investigation found that the lack of government facilities for local firms and societal norms in developing countries is a significant barriers to supply chain processes (Gligor et al., 2018). Lack of government involvement is just one of several problems that manufacturing companies must overcome before entirely using reverse logistics and developing a collaborative framework for effective operations (Agarwal et al., 2016). Furthermore, empirical research pinpointed that green supply chain evaluation for building projects in underdeveloped nations is hindered by a lack of governmental facilities (Elbarkouky & Abdelazeem, 2013). Major problems and obstacles of industry 4.0 in warehouses that prevent their application to advance Sustainable Development Goals in underdeveloped nations include a lack of government backing and legal constraints (Aravindaraj & Rajan Chinna, 2022).

Ineffective inventory management

According to an empirical study, inadequate inventory management in Ethiopia's healthcare supply chain system is the biggest obstacle keeping supply chain operators from achieving improved green supply chain performance (Jaeger et al., 2021). However, logistics procedures are complicated by inadequate inventory management within departments of the healthcare sector, which leads to numerous wasted resources and reduces the efficiency of the internal supply chain (Moons et al., 2019). Kamble et al. (2015) found that while supply chain management provides many services, it also has drawbacks, including poor inventory management that affects data warehousing, managing and structuring enterprise operations, and the organisation's operational effectiveness. Ineffective inventory management significantly influences the supply chain of the

commercial vehicle industry (Tripathi & Talukder, 2020). Mokheseng et al. (2017) study noted that ineffective inventory management contributes to the Incorrect and non-uniform ordering practices by the hospital and clinics industry. Ineffective inventory management in the manufacturing industry may result in surplus or shortages of raw materials, which will indirectly impact the firm performance and supply chain processes (Wei et al., 2017). Ineffective inventory control is a barrier to substantial vendor-managed inventory practices in the construction industry's supply chain (Radzuan et al., 2021). Research carried out by Karamshetty et al. (2022) identified that one of the issues with Inventory Management at Private Healthcare Facilities in Nairobi County is a lack of attention to detail in managing inventory.

Ineffective Cost Management

Cost management has been the leading performance measure historically. However, green supply chain management costs more than standard supply chain management. Two types of expenses are associated with environmental management: direct and transaction costs. Both forms of costs may hinder green supply chain management implementation. Furthermore, Ineffective Cost management is a significant hurdle to green supply chain management in the Indian automobile industry. Therefore, the high initial investment is needed for implementing information technology, acquiring expertise, and inspiring and educating supply chain partners and staff about green supply chain management practices (Luthra et al., 2011). Another empirical study highlighted that top management has cost constraints while executing reverse logistics strategies in vehicle industries (Ravi & Shankar, 2017).

Lack of information sharing

Lack of information sharing is the root cause of conventional managerial issues in disaster management activities (Dwivedi et al., 2018). According to the findings of M. A. Moktadir et al. (2018), when modelling pharmaceutical supply chains for effective decision-making, supply-related risks, including inadequate information sharing, should take priority over Risks associated with demand, finances, and operations for performance improvement of the industry. The lack of information sharing is one example of the problems traditional supply chain management techniques typically face in blockchain data management and disaster supply chain sustainability (Shareef et al., 2020; Wu et al., 2019). Failure to coordinate and share data among suppliers significantly hinders effective supply chain management and performance improvement in the

blockchain industry (van Engelenburg et al., 2018). A breakdown in communication between companies in the supply chain network significantly impacts an enterprise's profitability and ability to innovate. Also, the lack of stock management information exchange increases expenses and lowers service quality (Oumaima et al., 2019). Therefore, well-managed information sharing improves the effectiveness of ongoing supply chain management initiatives and the prospects for future supply chain management endeavours Abdulsalam and Schneller (2021) Identified that a lack of information sharing affects the relationships between the buyers and suppliers of the supply chains of the healthcare industry.

Lack of Quality Management

Obeth and Dunne (2008) argue that the supply chain in Indonesia lacks quality control systems at the production base, even though banana output has expanded over the previous five years. Furthermore, provider infection and nosocomial dissemination to healthy patients increases when inadequate quality control for temporary personal protective equipment and old items are frequently reused to save supplies (Chien et al., 2020).

Inadequate transportation systems

Poor transportation systems are widely believed to reduce industrial competitiveness by increasing freight unit costs, costing automotive businesses in India more than just freight. Damages sustained during shipping, total inventory, ordering, and operational and indirect expenses arise during the unsatisfactory transportation system (Gulyani, 2001). Recent research has shown that the region's inadequate transportation infrastructure severely hampered next-generation supply chain growth in emerging nations (De et al., 2011). According to Njume et al. (2020), many Cameroonian smallholder farmers lost tomatoes in the postharvest period because of mechanical damage sustained during the shipment and transportation of tomatoes from one location to another. Also, it is one of the critical issues that supply chain firms face when outsourcing most of their operations/functions to other competent and reliable organisations for effective performance systems and satisfying their customers. According to an empirical study, one of the five most significant supply chain obstacles for India's manufacturing sectors during the Covid-19 pandemic shutdown is an inadequate transportation system (Biswas & Das, 2020). Therefore, inadequate transportation infrastructure is more detrimental to the industry's economic growth than the high freight charges and other direct expenditures. Above all, an inadequate transportation system

within an organisation and its environs have contributed to the lack of performance improvement, including ineffective operational, financial, and non-financial performance, poor customer service and untimely delivery.

Inadequate Policy

At Geetanjali Woollens Pvt Ltd, the failure of Sustenance for Sustainability was caused by a lack of policy rules for company behaviour (Sahni & Chopra, 2019). Totobesola et al. (2022) argued that there need to be more policy frameworks in place across the continent to encourage interdisciplinary analytical methods and data-gathering initiatives that might help reduce food loss, especially in Africa. Notwithstanding, economies in Sub-Saharan Africa, which rely heavily on exports of commodities, continue to fall behind because of inadequate regulatory frameworks that lead to a dysfunctional supply chain and, ultimately, slow the region's economic growth (Kuteyi & Winkler, 2022). Furthermore, even if methods are available for fully recycling used lithium-ion batteries, the lack of permitted recycling facilities and a weak policy framework would make sustainable transportation difficult (Bhuyan et al., 2022). Olanrewaju et al. (2016), concluded that one of the most significant causes of housing shortages is ineffective government initiatives and policies. Ethiopia's weak policies on the markets for warqe food goods are one of the bottlenecks in the supply chain (Chaka et al., 2016). Carino et al. (2021), classified the lack of an effective policy system as a factor that inhibits hospital food service sustainability. Inadequate policy framework and flawed legislation prevent efficient Halal supply chain management (Khan et al., 2022).

Poor forecasting

Only if the merchant is an excellent forecaster will the manufacturer see any benefit from doing business with them. Conversely, if a retailer cannot predict future sales accurately, the manufacturer will suffer as the merchant learns to improve its forecasting methods (Taylor & Xiao, 2010). Hosoda and Disney (2009), argue that incorrect forecasts may only sometimes result in higher supply chain expenses. Reduced competitiveness, lost clients, and higher expenses result from a marketing department's failure to accurately forecast product and customer demand (Cheng et al., 2006). Furthermore, the research conducted by Jain et al. (2021), noted that Most supply chain organisations experience poor forecasting because of the E-supply chain, which increases the bullwhip effect by causing price volatility. Inaccurate forecasting of Farmers' requests for

seeds from research organisations and seed companies is one of the Seven significant difficulties identified that diminished trust and impeded the spread and adoption of High Yielding Varieties or enhanced maise seeds by small and medium farmers in Ghana (Quarshie et al., 2021)

2.4 Supply Chain Collaboration

The research identified that supply chain collaboration had been regarded as "supply chain integration", "supply chain alliance" supply chain corporation", "supply chain relationship", "supply chain association", "supply chain partnership", and "supply chain coordination", see Figure 2-3 for details. (Montoya-Torres & Ortiz-Vargas, 2014; Singh et al., 2018). According to Singh et al. (2018) and Montoya-Torres and Ortiz-Vargas (2014) further noted that several authors have researched supply chain collaboration using different terminologies as stated in Figure 2-3 and agreed that the meaning of supply chain collaboration and other related terminologies have the meaning. For the purpose of this study, the researcher chose to continue with the term "supply chain collaboration" which is used by different authors with slightly meaning.

Different interpretations of word 'collaboration'

Different interpretations of word 'collaboration'	References
Integration between parties	Bagchi et al., 2005; Frohlich & Westbrook, 2001; Pagell, 2004; Petersen et al., 2005; Vaart & Donk, 2008
Supply chain collaboration	Caridi et al., 2005; Holweg et al., 2005; Min & Roath, 2005; Shirodkar & Kempf, 2006; Stank et al., 2001; Vereecke & Muylle 2006
About alliances	Chung et al., 2008
Dyadic (e.g. buyer - supplier or buyer-manufacturer) relationships	Fynes et al., 2005a; Goffin et al., 2006; Kozan et al., 2006
Collaborative relationships	Hoyt & Huq, 2000; Johnston & McCutcheon, 2004
Partnerships	Gadde & Snehota, 2000; Spina & Zotteri, 2000
Supplier – retailer collaboration	Fu & Piplani, 2004

Figure 2-3: Synonyms of supply chain collaboration
Source: Singh et al. (2018).

Supply chain collaboration is the coming together of two or more independent organisations to operate jointly, plan, manage and implement their supply chain activities and achieve expected benefits and advantages (Min et al., 2005).

The term supply chain collaboration has been applied in different fields of study and defined by several authors depending on the field and context. It can be categorised into two groups' main areas: the "process" and "relationship" focus. Some authors viewed supply chain collaboration as

a business process that brings an organisation's supply chain partners together to operate effectively and achieve shared objectives (Manthou et al., 2004; Mentzer et al., 2001; C. Sheu, L. Lee, et al., 2006). Moreover, other researchers consider supply chain collaboration to be a creation of close and long-term partnerships of organisations in the supply chain to work together and share resources, information, and risk in order to achieve the desired results or goals (Bowersox et al., 2003; Golicic et al., 2003). The literature revealed that supply chain collaboration could be achieved by effective planning of resources and information sharing among partners in the supply chain and effective planning and efficient management of resources which is important in the operation and success of the organisational supply chain (Boddy et al., 2000). Lambert et al. (1999), state that cross-functional processes' integration in the supply chain is important for efficient and effective supply chain performance.

According to Foo et al. (2018), a company's ability to coordinate and increase operational efficiency in response to changes in customer specifications is improved by collaborating with suppliers for environmental purposes. In addition to helping reduce company waste, environmental impact, and supply chain expenses, supply chain collaboration also boosts consumer happiness. Kim and Umanath (2005), believe that coordination in the supply chain is crucial, particularly in setting the supply chain objectives (Peck & Jüttner, 2000). The flow of information and effective communication within the supply chains is key for performance improvement in the supply chain (Lamming, 1996). It is important to note that effective "process" and "relationship" in the supply chain operations result in ineffective supply chain collaboration. The process provides the structure, while the relationship provides long-term trust to manage the resources to achieve the desired outcomes effectively. The foundation of supply chain collaboration is found on the following factors such as information sharing (Manthou et al., 2004), resource sharing (Chwen Sheu et al., 2006), goal congruence (Angeles & Nath, 2001), decision making (Stank et al., 2001), and incentive alignment (Simatupang & Sridharan, 2005). The research by Pomponi et al. (2015) focuses on vertical and horizontal sustainable collaboration in the supply chain process, reverse and humanitarian logistics and identifies that collaboration is an important element of the supply chain which ensure effective performance (Palmieri et al., 2019).

2.4.1 *Types of Supply Chain Collaboration*

Supply chain collaboration is classified in different forms in literature, including vertical, horizontal, and lateral collaboration. The types of supply chain collaboration are determined by participant collaboration and attributes. Research conducted by Leising (2016) stated that there are two main forms of supply chain collaboration: vertical and horizontal. Lyons et al. (2012) are of the opinion that both vertical and horizontal supply chain collaboration leads to innovation in the supply chain network. Recent researches suggest that vertical and horizontal supply chain collaboration contributes to effective collaboration and collaborative relationship among the chain members (Chan & Prakash, 2012). Researchers maintain that the activities of supply chain collaboration are split into two types, such as vertical and horizontal supply chain collaboration (Muñoz-Villamizar et al., 2017; Petersson & Baur, 2018). Petersson and Baur (2018), state that vertical and horizontal supply chain collaboration involves the activities of internal and external actors.

Additionally, the internal and external supply chain members must collaborate to improve operational performance and achieve competitive advantages. Supply chain organisations concentrate on horizontal and vertical integration to increase their position in the competitive market and decrease uncertainty as well as transactional and logistic costs (Seo, 2014). In most cases, vertical and horizontal are needed across the supply chain systems due to difficulties in managing an organisation's wrongdoing. Organisations adopt collaboration to enhance the supply chain process, introduce transparency in the system and minimise supply chain risk. Braithwaite (2005) segments the activities of a supply chain into various functions to determine the effectiveness of vertical and horizontal collaboration, which suggests that it improves organisational performance.

Some researchers in different capacities stated that there are types of supply chain collaboration, such as vertical, horizontal, and lateral (multi-dimensional) collaboration. Additionally, the three types of supply chain collaboration improved the interaction between the partners and the scopes of collaboration in an organisation (Ahmad & Ullah, 2013; Allaoui et al., 2019; V. Kumar et al., 2017; Okdinawati et al., 2015; Singh et al., 2018). These types of supply chain collaboration enable the members to develop trust and effectively enhance the distribution of information. According to Allaoui et al. (2019), vertical, horizontal and lateral collaboration are used to align

organisational plans and explore different strategies and tactics at different supply chain processes. In addition, it assists the supply chain members in expanding and maintaining collaboration by sharing resources. It equally allows the supply chain members to determine the prospect of working together with potential supply chain partners. Singh et al. (2018) discussed that external collaboration of an organisation includes vertical, horizontal, and lateral collaboration as it enables the supply chain members to develop trust and improve the quality of information sharing. Most managers in organisations nowadays explore the combination of the types of supply chain collaboration to identify a suitable strategy for effective operation (Whipple & Russell, 2007). Figure 2-4 Analysis the process of types of supply chain collaboration as discussed in this section. Also, the figure 2.4 expresses how a focal company can be able to collaborate with other companies through vertical, horizontal, or lateral collaboration to achieve excellent performance and customer satisfaction.

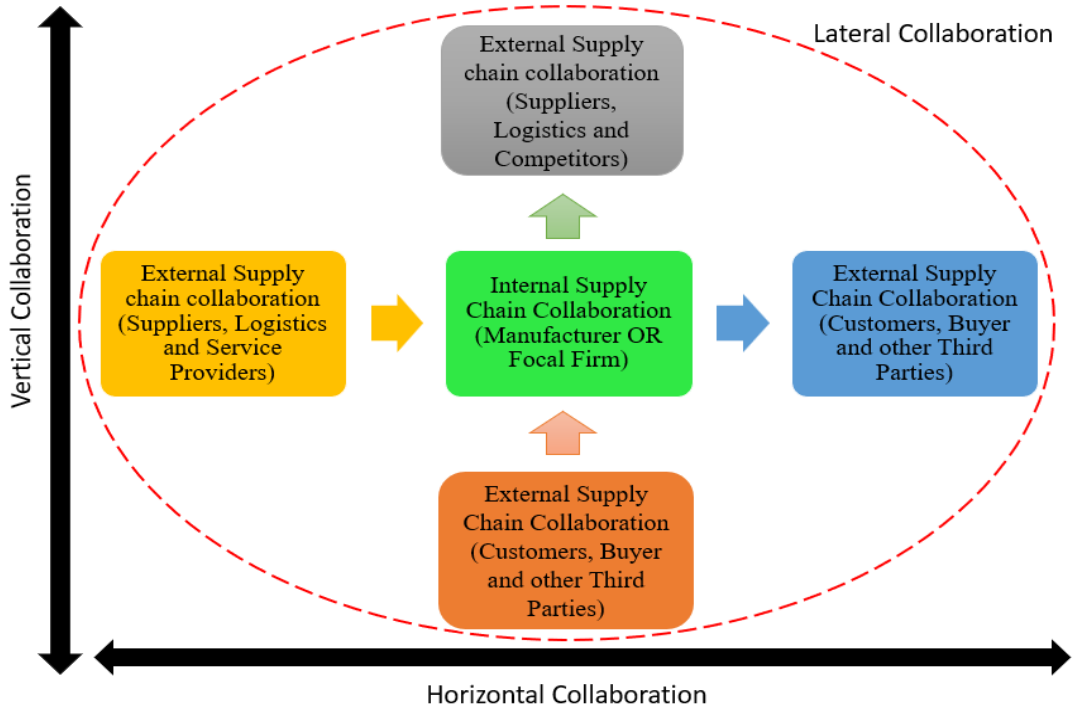

Figure 2-4: A diagram Explaining Types of supply chain collaboration.
Source: Adopted from Bjornfot et al. (2011).

*2.4.1.1 **Vertical supply chain collaboration***

This section of the study focuses more on vertical collaboration in the supply chain, which consists of internal and external collaboration. Internal collaboration includes the collaboration that exists

in an organisation within its subsectors. External collaboration encompasses the operations of two separate significant organisations within a supply chain network, such as the collaboration between the suppliers and customers. Also, customers and suppliers depend on their desire to develop a visible coordinating supply chain framework to increase performance (Ajayi, 2016; Heuer & Joly, 2018). Kotzab et al. (2011) stated that most organisations use strategic vertical integration to execute supply chain management operations through trust and commitment. Effective vertical integration enables effective information sharing, planning, and resource control in the systems. A vertical supply chain collaboration will reduce the information-sharing gaps in the system and the cost of operation (Vaaland & Heide, 2007). The research conducted by Leising (2016), suggested that vertical collaboration is the relationship that exists between the supplier and its customers.

Montoya-Torres and Ortiz-Vargas (2014), stress that the development of vertical collaboration helps facilitate the collaborative framework within the supply chain processes, which is key to performance improvement. Additionally, vertical collaboration enables supply chain members to interact actively with all the concerned stakeholders to enhance performance and provide transparency across the supply chain network.

Despite some challenges the organisation faces due to mistrust and confidentiality of information, researchers still strongly believe that vertical supply chain collaboration can be maximised through information sharing and effective communication systems to achieve a competitive advantage in the market (Zhang & Cao, 2018). Rodríguez-López et al. (2017), pointed out that efficiency, quality delivery, and performance can be achieved when organisations effectively utilise vertical supply chain collaboration. Petersson and Baur (2018) state that vertical collaboration positively impacts an organisation's production planning, demand planning, distribution management, and customer and supplier relationship management. Heuer and Joly (2018), state that the goal of vertical supply chain collaboration is to stabilise the operation of an organisation and its partners to enhance performance to achieve sustainable economic and social, and environmental opportunities. Buijs and Wortmann (2014) are of the opinion that a vertical supply chain collaboration is referred to as supplier-buyer collaboration, and understanding the buyers–suppliers relationship helps the organisation for effective decision-making. Lyons et al. (2012), suggest that vertical supply chain collaboration is more of a joint effort to improve the performance of an organisation.

2.4.1.2 ***Horizontal Supply Chain Collaboration***

Many researchers have identified horizontal supply chain collaboration as one of the main types of collaboration (Leising, 2016), referred to as supply chain process integration or operational linkages (Friday et al., 2018). Usually, horizontal supply chain collaboration is about working with entities at the same level of operations to develop more innovative products and meet customers' requirements. Horizontal supply chain collaboration enables the supply chain members to improve supply chain performance, traceability and transparency when planning for sustainable supply chain management across the supply chain networks (Wan Nurul Karimah Wan Ahmad et al., 2016; Wan Nurul K. Wan Ahmad et al., 2016). It describes a mutual collaboration between more than one independent entity operating at the same level in the supply chain network to make it easier to cooperate effectively towards achieving a mutual goal. This implied that horizontal supply chain collaboration could involve developing productive partnerships between competing and non-competing organisations. Allaoui et al. (2019) believes that horizontal supply chain collaboration has received little attention across supply chain industries and academics (Buijs & Wortmann, 2014; Wadhwa et al., 2006). Significantly few papers addressed horizontal collaboration through multicriteria model decision-making, as stated by (Li, 2012). Also, Li (2013) added that subsequent research should investigate the effects of horizontal supply chain collaboration in an organisation. Horizontal collaboration enables the supply chain partners to harmonise manufacturing and distribution processes and allows the decision-makers to focus more on policies (Ogunmola & Arogundade, 2019).

The combination of two or more separate or competing organisations to share valuable resources and information, for example, joint distribution centres (Chan & Zhang, 2011). Björnfot and Torjussen (2012) present that the structural stability of an organisation through horizontal collaboration in small and medium-sized enterprises contributes to regional economic growth. The key impact of horizontal collaboration is to lower logistic costs, increase productivity, create mutual expertise and increased service delivery (Björnfot & Torjussen, 2012). In addition, horizontal supply chain collaboration involves same-class partnerships (Dung, 2015).

The supply chain operators view horizontal collaboration as a possible chance for productivity increase, cost reductions, service improvement and market reinforcement (Klawer, 2013). G. Kumar et al. (2017) pointed out that horizontal supply chain collaboration happens when

organisations work together with their rivals to boost creativity, flexibility, and innovations. A new business model for collaboration in horizontal supply chains of the commodity industry is presented by Klawer (2013). Horizontal supply chain collaboration includes two or more independent or competing entities collaborating through sharing secret data and resources, such as a joint mode of transport between two operators (Okdinawati et al., 2015). Okdinawati et al. added that horizontal collaboration is used to reduce cost, increase competitiveness, reduce delivery delays, manage a trust, share resources, reduce capital issues and information sharing, and identify strategic partnership models. Seo (2014), suggests that further research is needed to provide in-depth knowledge on horizontal supply chain collaboration. Prior research develops a programme on horizontal supply chain collaboration to investigate the problems of loading schedules and vehicle consolidation across the logistics industry (Montoya-Torres et al., 2016). The involvement of related and non-related participants operating at the same level of various supply chains is referred to as horizontal supply chain collaboration. Research has shown that horizontal collaboration generally enables chain members to mitigate lost sales and increase long-term production value (G. Ahn et al., 2017; J. M. Ahn et al., 2017; Ahn et al., 2020; Ahn et al., 2018).

The essence of this study review is to enable an in-depth understanding of collaboration and how it helps organisations improve and remain active in the market. This is important to this study because it seeks to understand ways to improve supply chain performance in the oil and gas sector.

2.4.1.3 ***Lateral Supply Chain Collaboration***

Most research has identified lateral collaboration as another type of supply chain collaboration (Ahmad & Ullah, 2013; Cozzolino et al., 2017; Mason et al., 2007; Montoya-Torres & Ortiz-Vargas, 2014; Soosay & Hyland, 2015). The term “lateral collaboration” refers to a partnership that combines the advantages of both vertical and horizontal supply chain collaboration (Mason et al., 2007; Soosay et al., 2008). The study by Simatupang and Sridharan (2002) and Ahmad and Ullah (2013) noted that the goal of lateral supply chain collaboration is to obtain additional adaptability by merging and sharing competencies in both vertical and horizontal directions, supported by Chan and Zhang (2011). Nevertheless, most empirical studies have indicated that some top logistics companies balance vertical and horizontal inter-organisational relationships through lateral supply chain collaboration (Mason et al., 2007; Sanchez Rodrigues et al., 2015). Research by G. Kumar et al. (2017), stated that when firms combine vertical and horizontal

collaboration to obtain additional flexibility, this is an example of lateral collaboration. Lateral collaboration also allows the supply chain partners to effectively manage information and resource sharing, build trust among them, and improve their level of relationships (Nimmy et al., 2019). Soosay et al. (2008), used the examples of integrated logistics and intermodal transportation to illustrate how lateral collaboration may be used to synchronise shippers and carriers from several enterprises to create a smooth and efficient network for freight transportation. Bahinipati and Deshmukh (2014), pinpoint that the e-market intermediary can implement a lateral collaboration strategy to encourage suppliers and customers to work together in a competitive environment to improve the anticipated performance.

The lateral supply chain collaboration is noted as the effective system that an organisation implements in operations to achieve the benefits of both vertical and horizontal collaboration, leading to performance improvement and customer satisfaction. This study further found that lateral supply chain collaboration allows the supper chain partners to maintain effective relationships with their customers, suppliers, policymakers, manufacturers, and other related stakeholders in vertical or horizontal collaboration. Table 2-5 Cited the vital articles that discussed the types of supply chain collaboration in different industries and organisation.

Table 2-5: Types of Supply Chain Collaboration

Types of Supply Chain Collaboration	**Citations**
Vertical Collaboration	Ajayi (2016); Heuer and Joly (2018); Kotzab et al. (2011); Leising (2016); Montoya-Torres and Ortiz-Vargas (2014); Vaaland and Heide (2007); Zhang and Cao (2018)
Horizontal Collaboration	Allaoui et al. (2019); Buijs and Wortmann (2014); Friday et al. (2018); Leising (2016); Li (2013); Li (2012); Ogunmola and Arogundade (2019); Wadhwa et al. (2006); Wan Ahmad et al. (2016)
Literal Collaboration	Ahmad and Ullah (2013); Bahinipati and Deshmukh (2014); G. Kumar et al. (2017); Mason et al. (2007); Nimmy et al. (2019); Simatupang and Sridharan (2002); Soosay et al. (2008)

2.4.2 *The Enabling Factors of Supply Chain Collaboration*

Based on the literature reviewed, this study has identified several definitions of supply chain management and supply chain collaboration, revealing nine key enabling components of effective management of supply chain collaboration. The enabling factors of supply chain collaboration are information sharing, goal congruence, decision synchronisation, incentive alignment, resources,

and skills sharing, collaborative communication, and joint knowledge creation. These seven components enabled supply chain collaboration and interrelated to each other through relationships among them. They help in response time, product development, reduce costs of operation and effective management of resources. The key enablers of supply chain collaboration are shown in the Figure 2-5 below. Nevertheless, from the literature review analysis, Figure 2-5 indicates that information sharing, goal congruence and decision synchronisation are classified as the most significant enablers of supply chain collaboration with highest number of articles while collaborative commitment are classified as least enabler of supply chain collaboration with less than 20 articles. Also, Table 2-6 highlighted the authors that discusses the enablers of supply chain collaboration.

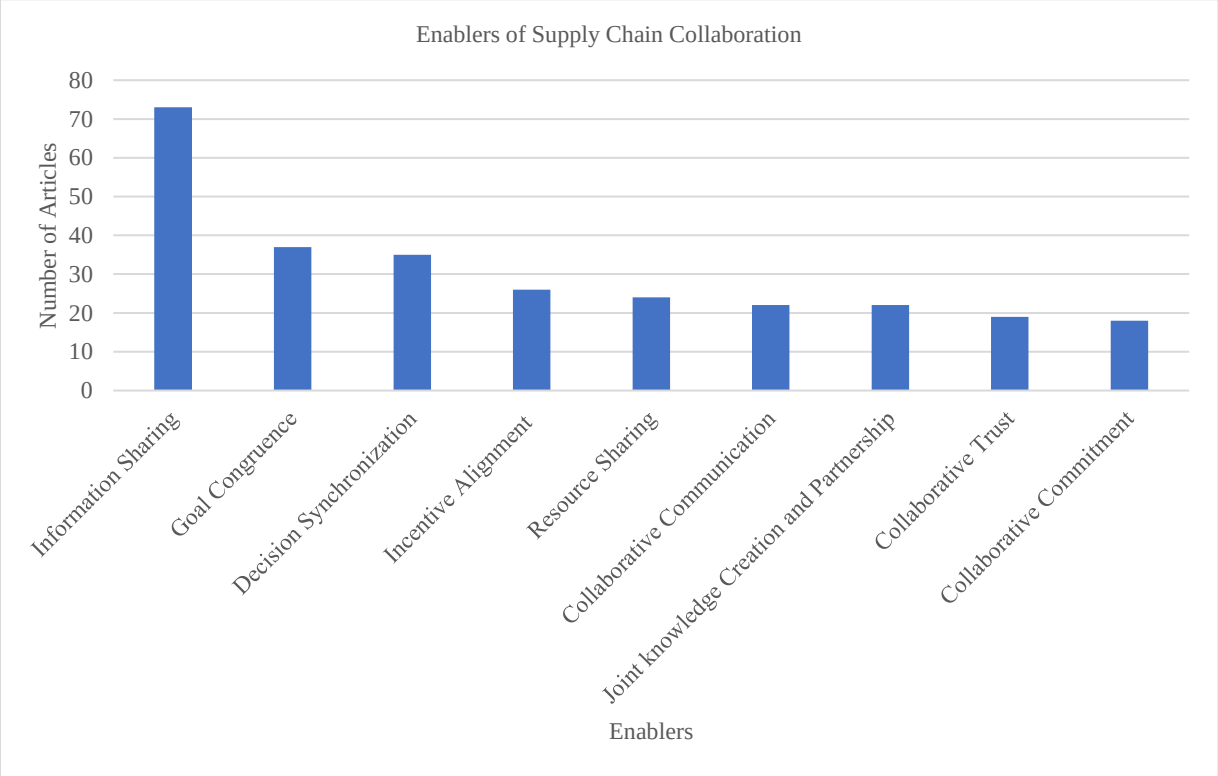

Figure 2-5: The Nine Key Enablers of Supply Chain Collaboration

Table 2-6: Enablers of Supply Chain Collaboration

S/No	Enablers of SCC	Citations
1	Information Sharing	Annosi et al. (2021); Chopra and Meindl (2001); Piboonrungroj et al. (2016); Ramanathan and Gunasekaran (2014); Singh et al. (2018)
2	Goal Congruence	Hosseini et al. (2016); Jia et al. (2016); Kärkkäinen et al. (2007); Piboonrungroj (2012); (Singh et al., 2018)

3	Decision Synchronisation	Cao and Zhang (2013); Duong and Chong (2020); Ramanathan (2014); Simatupang and Sridharan (2002); Singh et al. (2018)
4	Incentive Alignment	Arias Bustos and Moors (2018); Boyce (2016); Lee and Whang (2001); Singh et al. (2018); Umar and Wilson (2021)
5	Resource Sharing	Al-Refaie (2014); Annosi et al. (2021); Huang et al. (2020); Singh et al. (2018); Tseng et al. (2022)
6	Collaborative Communication	Farouk et al. (2020); Irani et al. (2017); Kwofie et al. (2019); Mohr and Nevin (1990); Tuten and Urban (2001)
7	Joint Knowledge Creation and Partnership	Bhatt and Grover (2005); Eskandari et al. (2021); Harland, Zheng, et al. (2004); Pradabwong et al. (2015); Samdantsoodol et al. (2017); Seo et al. (2015)
8	Collaborative Trust	Annosi et al. (2021); Irani et al. (2017); Jajja et al. (2014); Verstrepen et al. (2009); K. J. Wang et al. (2011)
9	Collaborative Commitment	Chabowski et al. (2022); Moberg and Speh (2003); Piboonrungroj (2012); Primo (2010); D. Zhang et al. (2012)

Information Sharing

This section summarises the critical literature about Information sharing, which refers to the extent to which an organisation exchanges its relevant, true, comprehensive, and confidential information on time with its supply chain partners (Cagliano et al., 2003; Chwen Sheu et al., 2006). Researchers consider information sharing as the "heart" of supply chain collaboration (Lamming, 1996), as the "lifeblood" of effective collaboration in the supply chain (Stuart & McCutcheon, 1996), and the "nerve centre" which is prime for effective operation in the supply chain (Chopra & Meindl, 2001). It is also considered to be an "essential ingredient" in the supply chain (Min et al., 2005), a "key requirement" for the effective implementation of supply chain strategy (Chwen Sheu et al., 2006), and a "foundation" that led of supply chain collaboration (Lee & Whang, 2001). Furthermore, describe information sharing in teams of connectivity as "the capability to exchange data in a timely, responsive, and usable format" as supported by Zhao et al. (2001). Y. Wang et al. (2011) concluded that effective information sharing among the partners contributes to optimising the electronic logistic marketplace's supply chain network and redirecting the partners' participation towards achieving performance improvement. Information sharing is identified as one enabler used to model the supply chain resilience framework (Hosseini et al., 2016). Effective information sharing enables organisations to manage and coordinate the flow of information, processes and raw materials from customer demand to raw material supply (Jia et al., 2016). The study by

Piboonrungroj et al. (2016), further highlighted that information sharing is one of the concepts of supply chain collaboration that leads to performance improvement in cultural tourism. Environmental change's unpredictability can be reduced by enhancing supply chain collaboration with effective information sharing across partners (Oh et al., 2020).

The advantages of information sharing in an organisation or business can improve operational effectiveness, decrease the bullwhip effect, better customer satisfaction and decision-making (Koçoğlu et al., 2011).

Goal Congruence

The extent to which supply chain partners come together to achieve a common goal in business is referred to as a goal. This is possible because the business partners agreed to work together in the supply chain to achieve the desired outcomes and improve their business performance (Angeles & Nath, 2001). Supply chain managers feel that true goal congruence is coinciding objectives or goals of supply chain partners. The foundation of the successful operation of this goal in an organisation is based on trust among partners. Some managers believe that goal congruence can be achieved by effectively implementing organisation goals and objectives and working according to the policy direction that the supply chain partners agreed upon. The overall idea behind goal congruence is a tool employed in an organisation's supply chain to improve performance (Lejeune & Yakova, 2005).

Decision Synchronization

Decision synchronisation is a process employed by supply chain partners to combine or compose decisions in the supply chain by planning activities and operations to optimise the supply chain benefits (Simatupang & Sridharan, 2002). Planning is vital for effective decision-making to determine the most efficient and effective policies to be utilised by the organisation in managing resources, responding to customers' demands, and being active in achieving a specific set of objectives or outcomes. These are fused into key planning decision categories in supply chain management, including operations strategy planning, production planning and scheduling, demand and order management, procurement, timely delivery, inventory management and effective distribution management (Lockamy & McCormack, 2004). Some organisations use joint planning to align collaborative partners and to implement decisions for effective performance improvement through inventory replenishment or stocking, warehouse management and order management ibid.

Blagojevic et al. (2021) demonstrated that decision-making based on objective data can be aided by artificial intelligence and Bahinipati and Deshmukh (2012) stated that tactical and operational levels are where the most effective decisions are most effective makes are made. The level of collaboration between the customer and suppliers is linked to practises and instruments such as shared and effective decision-making (Caniato et al., 2015).

Incentive Alignment

The process explored by organisations provides the opportunity for costs-sharing, risks-sharing, and benefits-sharing among partners in the supply chain (Simatupang & Sridharan, 2005). This process helps organisations to formulate an incentive scheme which enables them to share costs, risks and benefits which keep the organisation functional. It is significant to note that successful supply chain collaborations between organisations allow partners to share gains and losses, which justifies a perfect relationship. Strong collaboration outcomes can result from partners sharing common gains and losses because doing so fosters loyalty and trust between partners. This can be achieved by enabling parties in the supply chain to be gainfully involved in decision-making and beneficial operations, leading to success (Manthou et al., 2004). Incentive alignment involves a careful selection of strategies and definition of channels to help actualise the desired gains and sharing equitably, which implies that gains are associated with returns on investment and risk (Lee & Whang, 2001).

Resource Sharing

Resource sharing is a process used by an organisation which enables more vital collaboration among the supply chain partners. It is crucial in day-to-day operations, maximises access to many suppliers, and is timesaving. This can be physical (assets) resources, human capabilities, skills, and information. These resources positively impact performance improvement as it provides the enabling environment with operational tools for the successful and effective performance of an organisation which include facilities (warehouse), manufacturing equipment and technological support (Harland, Knight, et al., 2004; Harland, Zheng, et al., 2004). The literature identifies several applications of the approach in industrial operations and the networks it provides in order to strengthen performance, as discussed in the research on the auto industry (Dyer, 1996). In the trade sector, it is applied in practices for performance improvement. Such services include vendor-

managed inventory, enabling suppliers to assess stock-level data through the effective and efficient use of electronic data interchange and deciding on stock replenishment (Lamming, 1996).

Organisational friction and manufacturing discrepancies can be avoided by emphasising resource-sharing procedures among supply chain partners (Tseng et al., 2022). Supply networks succeed or fail conceptually based on the ability of partners to successfully share resources in changing circumstances (S. E. Fawcett et al., 2008). Furthermore, research has shown that a resource-sharing system is promoted by trust, which is necessary for efficient teamwork and the reduction of resource waste among the supply chain partners (Annosi et al., 2021).

Collaborative Communication

Collaborative communication has become an essential element in supply chain management activities through contact. It creates message transmission between supply chain partners, increasing frequency, influencing strategy, providing direction, and introducing transparency in the system. Close inter-organisational relationships can achieve that operations are open, frequent and balanced by implementing two-way or multilevel communication in the system (Goffin et al., 2006; Tuten & Urban, 2001). Mohr and Nevin (1990) explored the design and structure of communication from the mechanistic perspective using communication theory and recognised that frequency, the extent of bi-directional flows, informal modes, and indirect content are key attributes of communication. They suggested that the term "collaborative communication strategy" can be achieved when the key attributes of communication are gainfully utilised. Another research added that an effective collaborative supply chain could be achieved through communication among the supply chain partners (Adams et al., 2021). The importance of collaborative communication in the supply chain is to facilitate the exchange of knowledge, ideas and skills for better performance between the parties (Paulraj et al., 2008).

Joint knowledge creation and partnership

In a competitive market, joint knowledge helps supply chain partners create better and work together to respond to demand effectively and to understand how to operate better in a competitive environment (Malhotra et al., 2005). Two types of knowledge creation exist in the supply chain environment: knowledge exploration, which means searching and acquiring new and relevant environments and business knowledge. The second knowledge exploitation includes assimilating and applying relevant knowledge into business (Bhatt & Grover, 2005). Other researchers referred

to joint knowledge creation as the capture, exchange, and assimilation of knowledge, a process, technology application, or market knowledge between supply chain partners. These processes enable innovation and the long-term relationship in order to achieve competitiveness in the supply chain and its environment (Harland, Knight, et al., 2004; Harland, Zheng, et al., 2004).

Collaborative commitment

Collaborative commitment enables the supply chain actors to resolve supply chain conflicts and uncertainties within supply chain networks (Taieb & Affes, 2013). Kayikci et al. (2022) added that long-term commitment is needed to achieve an organisation's effective performance system and circular practice. A collaborative commitment to continuous innovation can accelerate the creation of new products and supply chain processes. A collective commitment supports judgments on allocating resources that may result in the intended innovation performance (Jajja et al., 2014). Most researchers contended that commitment is necessary to systematise and organise collaborative innovation through the supply chain operations (Braziotis & Tannock, 2011). The research carried by Prasanna and Haavisto (2018), identified collaborative communication as an enabler that improves dyadic relationships and contributes to long-term investment. A recent study indicates that collaborative commitment also contributes to effective relationships among the collaborators of the supply chain of the information technology industry (de Leeuw & Fransoo, 2009). Qu and Yang (2015) gave an example that the Companies under Chinese ownership say that the level of commitment to building and maintaining relationships with suppliers and consumers is significantly higher. An empirical study advises that shipping companies must develop a solid commitment to improve partner relationships and the industry's overall performance (Lai et al., 2020).

Collaborative Trust

Trust and honesty between the collaborative supply chain participants will lead to perfect supply chain unification (Al-Abdallah et al., 2014). Respect, honesty, trustworthiness, and mutual understanding are required for effective knowledge and information sharing, as well as collaboration in sharing risk and profit (Kim et al., 2018). It is defined as stakeholders' honesty and commitment when they follow transaction standards and maintain positive attitudes and behaviours (Wei et al., 2012). Trust and honesty between the collaborative supply chain participants, will lead to perfect supply chain unification (Oguche, 2018). Respect, honesty,

trustworthiness, and mutual understanding are required for effective knowledge and information sharing, as well as collaboration in the sharing of risk and profit (de Almeida et al., 2015). The crucial factors for organisational success were absolute honesty and open communication (de Almeida et al., 2015) .

The importance of trust and commitment in supply chain collaboration, as well as the potential to improve supply chain responsiveness in terms of agility and flexibility, were noted by (Carvalho et al., 2021). For the flow of information among partners, trust is also essential. At every stage of a company's activities and relationships, trust is critical for enhancing performance through collaboration. To achieve success and transparency, all parties involved in a supply chain network should develop trust and share relevant information on time. In the real world, if trust is not handled correctly, a multinational company's ability to work well can be in danger. Baah et al. (2021). Supply chain transparency improves when an organisation's interparty trust increases (Rejeb et al., 2021). Liao et al. (2021) found that upstream-downstream collaboration improved a company's innovative and competitive performance while building trust.

2.4.3 *Collaborative Supply Chain Barriers*

Several kinds of literature reviewed identified factors inhibiting collaborative supply chains leading to ineffective supply chain and their performance. Studies examine the factors inhibiting collaborative supply chains across organisations, disciplines, and sectors, which include industries like production, automobile, apparel, service, and manufacturing. The commonly identified ineffective supply chain collaboration factors include supply chain design, partnership or relationship, and performance evaluation metrics. These factors affect supply chain performance resulting in customer dissatisfaction, trust deficiency, and lack of information sharing and commitment. Also, poor planning led to ineffective decision-making, lack of transparency in supply chain strategy and inadequate partnership selection (Chung et al., 2008; Mentzer et al., 2000; Panahifar, Byrne, et al., 2015; Panahifar, Heavey, et al., 2015; Parung & Bititci, 2006; Singh et al., 2018; Singhry et al., 2015). Piboonrungroj (2012) further suggest in his research that a lack of capital and investment affects the level of collaboration between the supply chain members. Other researchers believe that the bullwhip effect in a supply chain network is caused by the lack of a collaborative supply chain (Islam, 2017; Shaban et al., 2019; Zhang, 2004). Simatupang and Sridharan (2011) state that an ineffective collaborative supply chain results from poor established

goals and unclear organisational policies. Figure 2-6 presented the bar chart of the inhibitors identified from the literature. In addition, the chart below show that lack of trust and lack of collaborative commitment are the most important inhibitors of collaborative supply chain while lack of collaborative communication and lack of information technology are the least inhibitors of collaborative supply chain identified from the literature reviewed.

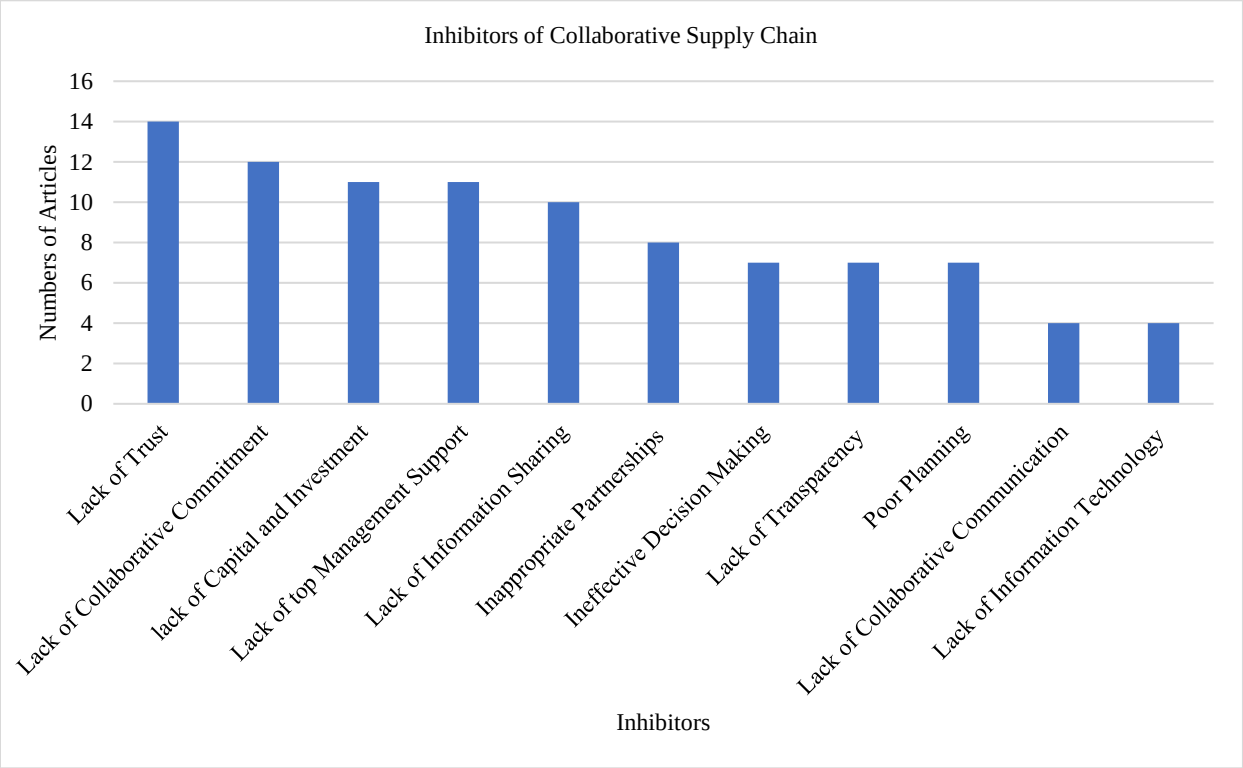

Figure 2-6: The Eleven Key Inhibitors of Supply Chain Collaboration

Lack of Information Sharing

Recent research noted that a lack of information sharing among the supply chain partners affects the optimisation of the collaborative electronic logistic marketplace (Y. Wang et al., 2011). Ineffectiveness in the supply chain system is caused by a need for more information sharing among collaborators. Furthermore, a lack of interoperability in information technology makes it difficult for people to apply their valuable information without spending much time and effort. As a result, a setup blockchain technology can support the transfer of organised, standards-based data matched to supply chain requirements to mitigate these issues (Rejeb et al., 2021).

Lack of trust

Lack of trust has been identified from the literature review as one of the key variables that impact the adoption of supply chain collaboration in an industry (S. E. Fawcett et al., 2008; Gopal & Thakkar, 2016; Jena & Ghadge, 2021; Luthra et al., 2011; Panahifar, Heavey, et al., 2015). The improper partner selection results in obstacles to CPFR execution, such as a lack of trust (Barratt & Oliveira, 2001; Hollmann et al., 2015; Panahifar, Heavey, et al., 2015). An empirical study noted that a lack of trust affects the buyer and suppliers' relationships, and the integration of the supply chain processes, inhibiting an organisation's effective performance system.

Lack of collaborative commitment

The literature review profiles the lack of supply chain commitment as one of the significant barriers to the collaborative supply chain that contributes to an ineffective performance system in an organisation (De Freitas et al., 2019; Irani et al., 2017; Panahifar, Heavey, et al., 2015). Also, the primary obstacle that faces successful supply chain joint ventures is a need for more commitment from both the company partners and the members of those companies. The study by De Freitas et al. (2019) classified lack of commitment as part of the behavioural and cultural factors of the chain members in the supply chain process. It also leads to poor distribution of appropriate information (Panahifar, Heavey, et al., 2015). The obstacles to successful supply chain collaboration and green supply chain emerge from poor commitment on the part of organisations due to excessive costs and organisational issues (Kotzé et al., 2017). As documented by Wagner et al. (2003), lack of commitment has hampered the smaller and medium companies' efforts to expand their online operations.

Lack of capital and investment

Even though supply chain collaboration has helped improve the operations of many companies (Hofman & Aronow, 2012; Piboonrungroj, 2012), other studies also reported that it has failed on many occasions (Bragg et al., 2011; Piboonrungroj, 2012). The inability of small and medium enterprises to invest in research and development due to financial constraints is a possible impediment to their development of resilience (Ali et al., 2017). Lack of capital and investment in organisational and technological infrastructure has also prevented most firms from attaining synchronised inventory movements (Ahmad & Ullah, 2013). Furthermore, empirical research added that inefficiencies caused by a lack of capital and investment in cargo-handling equipment limit the efficiency of port businesses and operations (Oguche, 2018). Another prior study

expresses that many supply chain firms encounter obstacles that hinder their chances of survival, growth, and success, such as a lack of capital and investment (Loury-Okoumba & Mafini, 2021).

Lack of top management supports.

As identified from the literature review, lack of top management support is another barrier that inhibits effective performance systems and business integration through supply chain collaboration (Kotzab et al., 2011; Mentzer et al., 2001; Premus & Sanders, 2008). Change in an organisation can be inhibited by opposing forces, such as a lack of support from top management, which requires a proportional reaction on the part of management to improve efficiency and achieve targeted goals (S. E. Fawcett et al., 2008; Stanley E. Fawcett et al., 2008; Richey et al., 2012). Also, the study by Gul (2013) identified the lack of top management support as part of the human-related drivers that impacted the collaborative supply chain. Problems in supplier partnerships typically result from a need for more engagement from upper management (Min, 2015).

Inappropriate partnership

The outcome of the literature review shows that inappropriate partnership contributes to the failure the supply chain collaboration in an organisation (Chung et al., 2008; Singh et al., 2018; Singhry, 2015; Singhry et al., 2015). Hui et al. (2015) argue that an organisation's supply chain collaboration and innovation success suffer when careful consideration is not given to which Partnerships to form. Nevertheless, effective partnership selection allows the participating members to effectively manage information sharing, decision making and planning during the supply chain processes.

Poor planning

Poor planning was identified as one of the inhibitors of supply chain collaboration (Majumdar et al., 2022; Stadtler & Kilger, 2008). Poor planning leads to customer dissatisfaction, poor marketing and forecast organisational products and project management failure (Bhattacharya & Fayezi, 2021; Min, 2015). Due to poor planning and communication issues, producers and merchants are to blame for promotional out-of-stocks (Whipple & Russell, 2007). Poor communication between partners leads to bad planning when geography and infrastructure create logistic challenges (Al Adem et al., 2018). Chalker and Loosemore (2016) concluded that poor planning contributes to the poor productivity of Australian construction projects.

Ineffective decision making

An empirical study states that ineffective decision-making is the primary cause of inappropriate relationships among the collaborative partners of the supply chain (Kwon et al., 2007; Muckstadt et al., 2001). Furthermore, the Misuse of social capital may result from a lack of decision-making, affecting buyer performance (Grover et al., 2006; Villena et al., 2011). The direct and indirect effects of poor decision-making are more detrimental to companies the more dependent they are on suppliers (P. Liu et al., 2022).

Lack of transparency

Following the review conducted for this study, lack of transparency was identified as one of the significant barriers that impact an organisation's effective collaborative supply chain system. Collaboration in sub-supplier management is more complex and challenging than managing direct suppliers due to the lack of transparency regarding sub-suppliers participation in a focal firm's supply chain operations (Grimm et al., 2014). According to Lambin et al. (2018), collaboration on corporations' zero-deforestation strategies may be inadequate to significantly impact the supply chain processes due to a lack of transparency and accountability. The primary collaboration and purchase barriers to organic food supply chain sustainability are a lack of transparency and trust in labelling and certifications (Terlau & Hirsch, 2015). Concerns about the lack of transparency in global companies' mineral supply chains have led to more protests and pressure from the stakeholders (Islam & van Staden, 2018). Therefore, a lack of transparency in a collaborative supply chain system inhibits the effective delivery of the company's products to the customer and leads to mistrust and withholding vital information between the supply chain partners.

Lack of collaborative communication

Another significant barrier to a collaborative supply chain identified from the literature review is a lack of collaborative communication (Panahifar et al., 2014; Pizarro et al., 2018; Premus & Sanders, 2008; Taieb & Affes, 2013; Vriens, 2021). Research has shown that poor communication among the collaborators affects the delivery cycle time and supply chain planning (van der Vorst, 2000). Islam and van Staden (2018) confirmed that poor communication is the leading reason for failed partnerships between collaborative supply chain companies and non-profit organisations (Green & Keogh, 2000). A lack of communication about individual intentions delayed the collaborative training scheme, depleting relational capital (Premus & Sanders, 2008). Balaji and

Arshinder (2016) found that strengthening food supply chain communication reduced costs and waste. Proper communication lowers uncertainty and helps respond to supply chain problems. Effective decision-making must have better communication between the participants in the food supply chain, particularly between those who are one step up and one step down in the chain. Balaji & Arshinder further noted that lack of communication is one of the reasons for perishable food waste during the supply chain processes.

Lack of information technology

It has been determined by a recent study that improper adoption of information technology is the most significant hurdle that may drive enterprises to develop sustainable supply chain management techniques to guarantee the effective continuation of businesses (Movahedipour et al., 2017). Lack of information technology in supply chain systems hinders industrial and business growth of green argi-food in Azerbaijian (Mehdiyeva et al., 2020). A prior study revealed that a lack of information technology is one of the most significant obstacles to implementing green supply chain management and collaboration in the Tech Manora industry (Reddy et al., 2018). The inability of the smaller partners to leverage information technology to their full capacity is another factor restricting the achievement of supply chain potential (Seethamraju, 2006). Nevertheless, a lack of information technology in a given supply chain network leads to better communication, a better delivery system, accurate decision-making, and better financial management.

Table 2-7: Inhibitors of Collaborative Supply Chain

S/No	Barriers of SCC	Citations
1	Lack of information sharing	Eskandari et al. (2021); S. E. Fawcett et al. (2008); Singh et al. (2018); Vollrath (2021); Y. Wang et al. (2011)
2	Inappropriate partnerships	Mentzer et al. (2000); Panahifar, Byrne, et al. (2015); Parung and Bititci (2006); Singhry (2015); Xiaoli (2012)
3	poor planning	Chung et al. (2008); Mentzer et al. (2008); Panahifar, Byrne, et al. (2015); Parung and Bititci (2006)
4	ineffective decision making	Chung et al. (2008); Mentzer et al. (2000); Panahifar, Byrne, et al. (2015); Panahifar, Heavey, et al. (2015); Parung and Bititci (2006); Singhry (2015)
5	lack of transparency	Chung et al. (2008); Panahifar, Byrne, et al. (2015); Panahifar, Heavey, et al. (2015); Parung and Bititci (2006); Singh et al. (2018)
6	Lack of information technology	Oyedijo et al. (2021); Ramesh et al. (2010); Reddy et al. (2018); Xiaoli (2012)
7	Lack of Trust	Annosi et al. (2021); Arias Bustos and Moors (2018); Baharmand et al. (2021); Daudi et al. (2016); S. E. Fawcett et al. (2008)

8	Lack of collaborative communication	Arias Bustos and Moors (2018); Bahinipati and Deshmukh (2012); Stoelzle and Burkhardt (2021); Taieb and Affes (2013)
9	Lack of top management support	Agyemang et al. (2018); Akintoye et al. (2000); Andalib Ardakani et al. (2022); Md Abdul Moktadir et al. (2018); Ramesh et al. (2010)
10	lack of capital and investment	Ali et al. (2017); Bimha et al. (2020); Fachrunnisa et al. (2013); Langeveld et al. (2010); Reddy et al. (2018)
11	Lack of collaborative commitment	Butt et al. (2021); Dixit et al. (2017); Duryan and Smyth (2019); Hussain et al. (2019); Zou and Couani (2012)

2.4.4 *Benefits of Supply Chain Collaboration*

The collaborative advantage is also called joint competitive advantage (Jap, 2001). It refers to strategic benefits gained over market competitors (Ma et al., 2021) through supply chain partnering. Collaborative advantage relates to the desired synergistic outcome of collaborative activity that could not have been achieved by any firm acting alone (Vangen & Huxham, 2003). Jap (1999) states that collaboration can increase the size of the joint benefits and give each member a share of more significant gain that each member on its own could not generate. The value creation from collaboration could be cost savings through the transfer of best practices, enhanced capacity and flexibility for collective actions, better decision making and increased revenue through resource synergy, and innovation through the combination and cross-pollination of ideas. The benefits of business synergy may not be immediately visible; however, potential long-term rewards are enticing and strategic (Min et al., 2005). The key benefits of supply chain collaboration are that it leads to process efficiency, flexibility, business synergy, quality, and innovation (Duffy & Fearne, 2004a, 2004b). Efficiency, consistency and effective strategy, transparency, and mutual financial benefit are advantages of collaboration for both customers, suppliers, and other

stakeholders (Dell & Hart, 2014). Figure 2-7 presented the bar chart of the inhibitors identified from the literature.

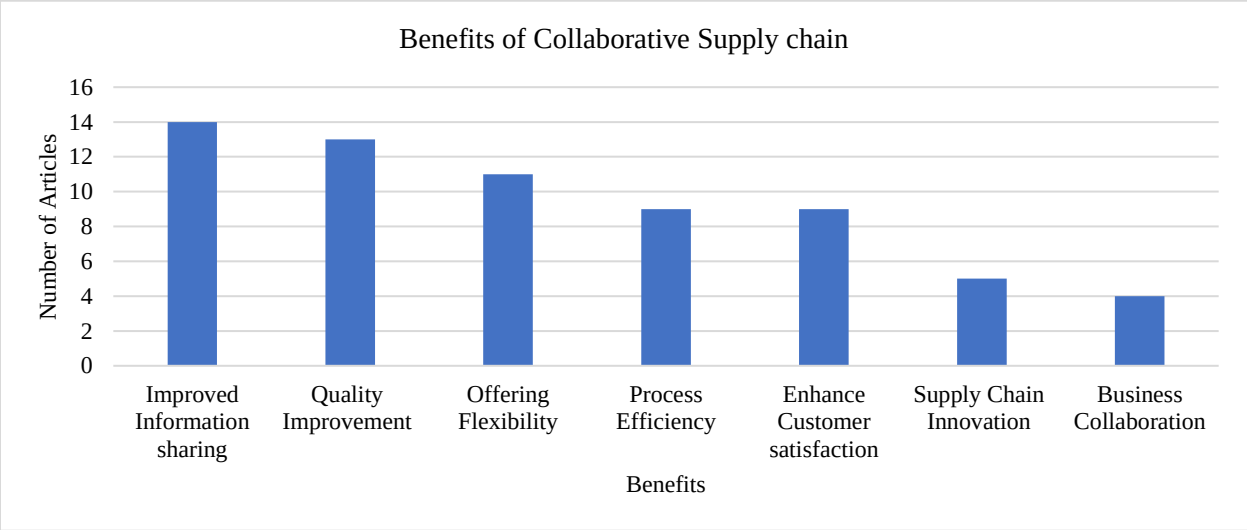

Figure 2-7: Benefits of supply chain collaboration

Table 2-8: The Seven Key Benefits of Collaborative Supply Chain

S/No	Benefits	Citations
1.	Improved Information sharing	Daugherty et al. (2006); Jayaram et al. (2004); Kache and Seuring (2014); Ramanathan (2013); Smirnova et al. (2011)
2.	Quality Improvement	Daugherty et al. (2006); Garvin (1988); Harvey and Gray (1992); Nooteboom et al. (2007); Yazar Soyadı and Ince (2015)
3.	Offering Flexibility	Bagchi et al. (2005); Chen et al. (2013); Gupta et al. (2001); Kim (2013); Nyaga et al. (2010)
4.	Process Efficiency	Bagchi et al. (2005); Bowersox (1990); Jayaram et al. (2004); Singh et al. (2018); Walker et al. (2000)
5.	Enhance Customer satisfaction	Daugherty et al. (2006); Hult et al. (2004); Nyaga et al. (2010); Singh et al. (2018); Udin et al. (2006)
6.	Supply chain Innovation	Handfield and Pannesi (1995); Kaufman et al. (2000); Kessler and Chakrabarti (1996); Sengupta et al. (2006); Simatupang and Sridharan (2008)
7.	Business Collaboration	Kaufman et al. (2000); Orriens and Yang (2006); Ralston et al. (2017); Tanriverdi (2006)

Improved Information sharing

Recent research noted that information sharing enables the supply chain partners to reduce organisational uncertainty, bullwhip effects, and delivery time, improve decision-making, effective teamwork, and maximum capacity utilisation (Ma et al., 2021). The level of information shared among the collaborators determines the level of trust and relationship among supply chain

partners. For instance, a company might collaborate effectively with its supply chain and enhance the performance of its participants through information sharing. The study by Baah et al. (2022) recommends using warehousing and transport management systems, as well as material demand planning, electronic data interchange, and enterprise resource planning (ERP) software, to help supply chain participants better collaborate and share information.

Quality Improvement

Quality improvement is a strategy employed by an organisation to maintain the standard of product in the market. This ensures that supply chain partners stick to the agreed standard and provide the best quality product, which creates satisfaction and higher value for customers (Harvey & Gray, 1992; S. Li et al., 2006; S. C. Li et al., 2006). Quality improvement is one of the critical competencies that keep a product viable in the market; organisations are expected to respond fast to customer needs with high-quality products and innovative designs. It enables efficient sales, increases customer loyalty, and maximises market share and profits. Garvin (1988), in his research, identifies some key components that an organisation can achieve with a good quality product in the market. Perceived quality is the bedrock of an organisation's functioning but is challenging to quantify because it varies significantly with factors like complexity, size, and context. This includes increased efficiency, flawless production, reliability, conformity, precision, durability, serviceability, and longevity. Quality performance improvement plays a crucial role in the successful operation of an organisation because it ensures retention of customer loyalty, creates long-term customer relationships, and enables long-term profit maximisation, which is prime for organisation success.

Offering Flexibility

Flexibility is the capabilities of an organisation in the supply chain to respond to changes in products or services in the marketplace. For example, improving features, volume management, and speed in terms of timely response are critical in responding to environmental and market changes (Holweg et al., 2005a, 2005b). Some literature referred to flexibility as customer responsiveness (Holweg et al., 2005a, 2005b; Kiefer & Novack, 1999). The role played by flexibility in the collaborative supply chain is the ability to bring organisations together quickly to adopt changes in structures, information-sharing processes, and new development (Gosain et al., 2004). In addition, organisations pay more attention to customer satisfaction via quick delivery

and effective time management. These processes can be achieved by flexible processes accepted and implemented by organisations in the supply chains (Bagchi et al., 2005).

Process Efficiency

Process efficiency examines how organisations collaborate with their suppliers in the supply chain regarding information, reduce cost and achieve competitive advantage (Bagchi et al., 2005). This process typically involves information sharing, a joint logistics process, a collaborative product development process, or a collaborative decision-making process. Process efficiency is a measure of success and a determinant factor for profit maximisation, for example, effective inventory turnover and operating costs, ibid. Supply chain collaboration facilitates the cooperation of participating members in the supply chain to improve performance (Bowersox, 1990). The benefits of collaboration include cost reductions and revenue enhancements (Lee et al., 1997).

Enhance customer satisfaction.

Ramdas and Spekman (2000) noted in their research that customer satisfaction is one of the performance variables used to examine the extent and level of performance in an organisation that provides an effective supply chain system and collaboration among the supply chain partners. In addition, organisational customers are more satisfied with inventive high performers than with high functional performers. Ramdas and Spekman also showcase that customer satisfaction is one of the core reasons why most organisations seek to collaborate effectively to achieve an effective supply chain system that will enable them to improve the entire performance system. Our findings support that integrating supply chains and exploiting supply chain partners' expertise to promote customer satisfaction are keys to organisational success.

Research by Attaran and Attaran (2007) Indicates that customer satisfaction is an essential success factor influencing collaborative planning forecasting and replenishment among supply chain collaborators and organisations. Setyaningsih et al. (2021) Pointed out in their study that customer satisfaction is one of the core drivers of supply chain management in small and medium enterprises and significantly impacts supply chain management implementation. An organisation that places a high emphasis on customer satisfaction impacts consumer happiness daily, which leads to lasting relationships and loyalty. A recent study claims that supply chain members could detect the processes and strategies critical to improving customer satisfaction by collaborating with appropriate partners (Fawcett et al., 2008; Stanley E Fawcett et al., 2007; Stanley E. Fawcett et al., 2007). Effective resource utilisation, lower operational costs, higher profits, enhanced customer

satisfaction and product development efficiency, are all advantages of supply chain collaboration among the supply chain partners (Allaoui et al., 2019).

Supply Chain Innovation

The strategy behind innovation as a benefit for effective supply chain collaboration is the ability to significantly improve on a product or the creation of a new product which can stand the test of time by increasing its shelf life. This can be achieved by joint decision-making and developing problem skills in the supply chain, which help compete in a highly competitive market. In addition, the benefits of innovation are the organisational transformation in the product life cycle and ensuring customer satisfaction with quality products (Handfield & Pannesi, 1995; Kessler & Chakrabarti, 1996). This can be achieved by carefully managing supplier relationships through joint decisions, customer feedback, and practical information sharing in the system. Finally, the decision lies in the hands of organisations to develop the ability to design and implement policies that will accommodate process and product innovation to improve its performance in the market (Kaufman et al., 2000).

The literature reviewed the benefits of supply chain collaboration and provided an in-depth understanding of collaboration in improving the performance of an organisation in different disciplines. This insight lightens the key ideas which are crucial for the conduct of this study as well as looking at collaboration for performance improvement in the oil and gas industry which happens to be the main focus of the study.

Business Collaboration

Business collaboration is the degree to which supply chain partners combine, harmonise, and pull resources together to achieve specific goals and objectives (Orriens & Yang, 2006). They went further to state that collaboration can produce a combined return on resources in the single operation of an organisation in a competitive environment and market. This joint effort or teamwork in any organisation results in better decision-making and effective resource sharing in the supply chain; this includes physical assets such as manufacturing facilities and warehouses. Other resources include customer knowledge, technological application, organisational culture, expertise, and skills (Kaufman et al., 2000). Tanriverdi (2006) states that two sources of synergy include super-additive value through corresponding resources and sub-additive cost, which in most cases are referred to as economies of scope by alternative resources.

2.5 Supply Chain Performance

Supply Chain Performance is the ability of organisations to plan and effectively manage supply chain activities in meeting or satisfying customers' demands. This includes ensuring product availability, timely deliveries, and effective and efficient capacity planning to respond quickly to customers' orders (Aramyan, 2007; Aramyan et al., 2007). Additionally, this could apply to procedures that transform raw materials or inputs into final goods (Beamon, 1999). It has no universally accepted definition and measurement standard. However, it has been applied in different fields, such as marketing, production and manufacturing, service industries, agri-food supply chains, and logistics, to determine performance (Aramyan et al., 2006; Lai et al., 2002; Van Der Vorst, 2005).

The study of Manupati et al. (2020) uses ledger-based blockchain to monitor and optimise the performance of the fashion supply chain network. The research outcome of Zhou and Benton (2007) demonstrates that solid supply chain performance depends on efficiently sharing information and supply chain systems. The best method to improve the performance system of the supply chain is to integrate information among suppliers and retailers. This integration includes information exchange, synchronised replenishment, and collaborative product creation and development (Kulp et al., 2004). The study by Fawcett et al. (2007) shed light on how information technology (IT) is utilised to improve the supply chain performance of a supply chain network. The bullwhip effect increased variation upstream in a supply chain, which is the most renowned example of how decentralised decision-making can harm supply chain performance (Fiala, 2005). Sheu et al. (2006) Noted that a collaborative supply chain between the supplier and retailer enhances the level of performance of a supply chain system. The performance of the supply chain has been significantly improved due to the timely, accurate, and dependable information that has been made available through information technology (Li et al., 2009).

For example, during war (Russia Vs Ukraine) that affected supply of raw material to companies causing scarcity, A company that has a good supply chain collaboration with its supplier at external or outside its operation zone will ensure that materials are supplied to its collaborator first. It is important to collaborate with suppliers because they are outside your reach and the company depend on the supplier’s raw materials for effective production. Any practical examples of improving supply chain.

In many cases, organisations look at performance from the perspective of financial goals against their competitors (Barua et al., 2004; Li et al., 2006; Yamin et al., 1999). Generally, organisational

performances are measured by sales growth, profit margin, return on investment and effective inventory management. Many researchers and stakeholders consider these measures as a standard in evaluating the activities of an organisation (Chang & King, 2005; Chen & Paulraj, 2004; Flynn et al., 2010; Kenneth Petersen & Monczka, 2005; Narasimhan & Kim, 2002; Vickery et al., 1999). The enablers for performance management include the application of processes, metrics and approaches, a technology which helps implement supply chain strategies, planning and resource control (Van Der Vorst, 2005; Van Der Zee & Van Der Vorst, 2005). The key inhibitors usually associated with the supply chain performance of an organisation include the facilities, effective inventory management, transportation systems and information sharing in the system (Gunasekaran et al., 2006; K. Shaw et al., 2020; R. N. Shaw et al., 2020).

Based on the literature reviewed, it was revealed that supply chain collaboration is crucial in many organisations' realisation of supply chain performance. Interestingly, this huge importance of supply chain collaboration in improving operational performance has not been fully utilised in the oil and gas sector, particularly in Nigeria, which is the gap. This study seeks to address the issues surrounding the effective implementation of the strategies and approaches to achieve the desired goals and objectives of an effective supply chain in Nigeria's oil and gas industry. However, it was observed that supply chain performance could be affected by the uncertainty's organisations face, such as environmental and economic challenges revealed in the literature.

The Figure 2-8 show the countries Analysis on Supply Chain performance and Oil and Gas Industry Publications. The figure also, indicates that United States and United Kingdom has the highest publications of supply chain performance in the oil and gas industry while Nigerian and Mexico has insignificant publications that relates to supply chain performance in the oil and gas industry. Based on this, the researcher concluded that there is gap in publication when it comes to Nigeria and supply chain performance.

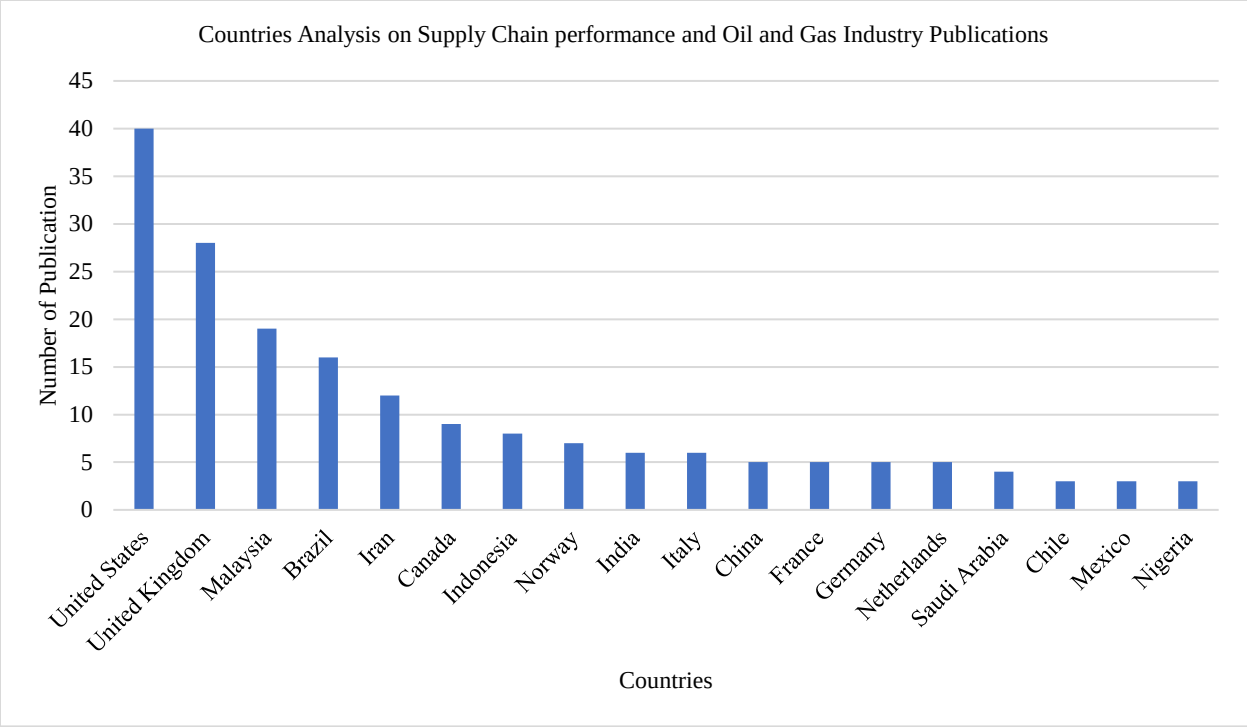

Figure 2-8: Countries Analysis on Supply Chain performance and Oil and Gas Industry Publications

Figure 2-9 show the article publications of supply chain management and oil and gas industry by countries. The figure below also indicates that there are limited publications of supply chain management in the oil and gas industry when compared to other industry and nations. Going further, Figure 2-9 highlight that United States, United Kingdom, and Malaysia has the highest oil and gas supply chain management publications while other countries have little or no publication that relates to oil and gas supply chain management. The chart also indicates that the countries with little or no publication like Nigeria requires more empirical studies and publication. In conclusion, the researcher concluded that there is gap in publication that discusses supply chain management in the oil and gas industry. Using Nigeria as a case study for data collection, this study adds to the body of knowledge by analysing and subsequent development of a model for the adaptation of supply chain collaboration leading to the effective improvement of supply chain performance in the supply chain system of the oil and gas industry.

There is a strong connection between a publishing gap and a knowledge gap. An absence of research articles, papers, or other scholarly publications on a particular area or within a certain discipline is referred to as a publication gap. It implies that there is little knowledge about that topic available to the general public and the scholarly community. On the other side, a knowledge

gap describes a lack of information or awareness of a certain subject. It means that there are unresolved issues, uncharted territory, or portions of a subject that have not been thoroughly researched.

The relationship between these two ideas is that a publishing gap frequently represents a knowledge gap. A lack of published study and literature on a certain topic suggests that there is little knowledge and comprehension of that subject. It implies that there is a knowledge gap since that particular field has not been thoroughly examined or investigated by researchers and academics. Finding a gap in the literature is an important stage in research since it enables investigators to identify knowledge gaps and areas that require more study. Researchers can find possibilities for additional research and help close the knowledge gap by recognising the lack of published studies or little research output on a certain issue.

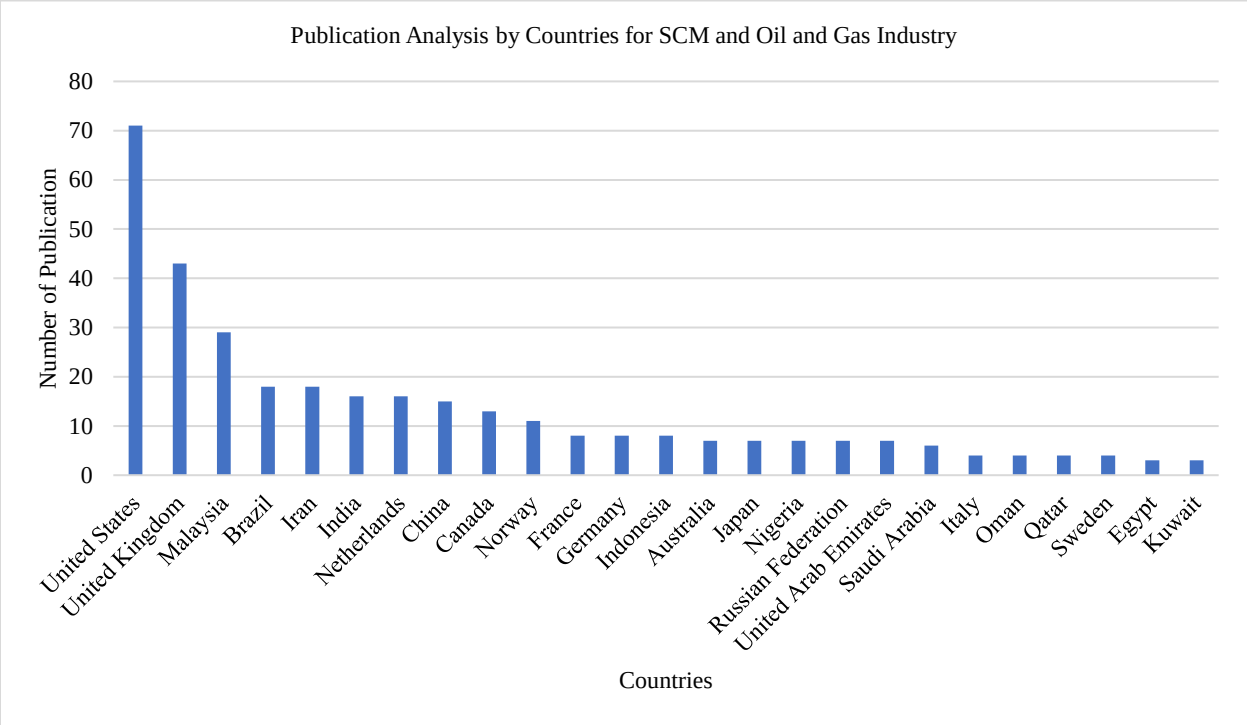

Figure 2-9: Publication Analysis by Countries for Supply Chain Management and Oil and Gas Industry

Figure 2-10 analysis the articles by countries of supply chain collaboration and oil and gas industry. The chart below portrays that there is limited knowledge on supply chain collaboration in the oil and gas industry. The chart further explained that United State and United Kingdom has the highest

supply chain collaboration articles in the oil and gas industry and Nigeria is among the countries that has lesser articles on oil and gas supply chain collaboration.

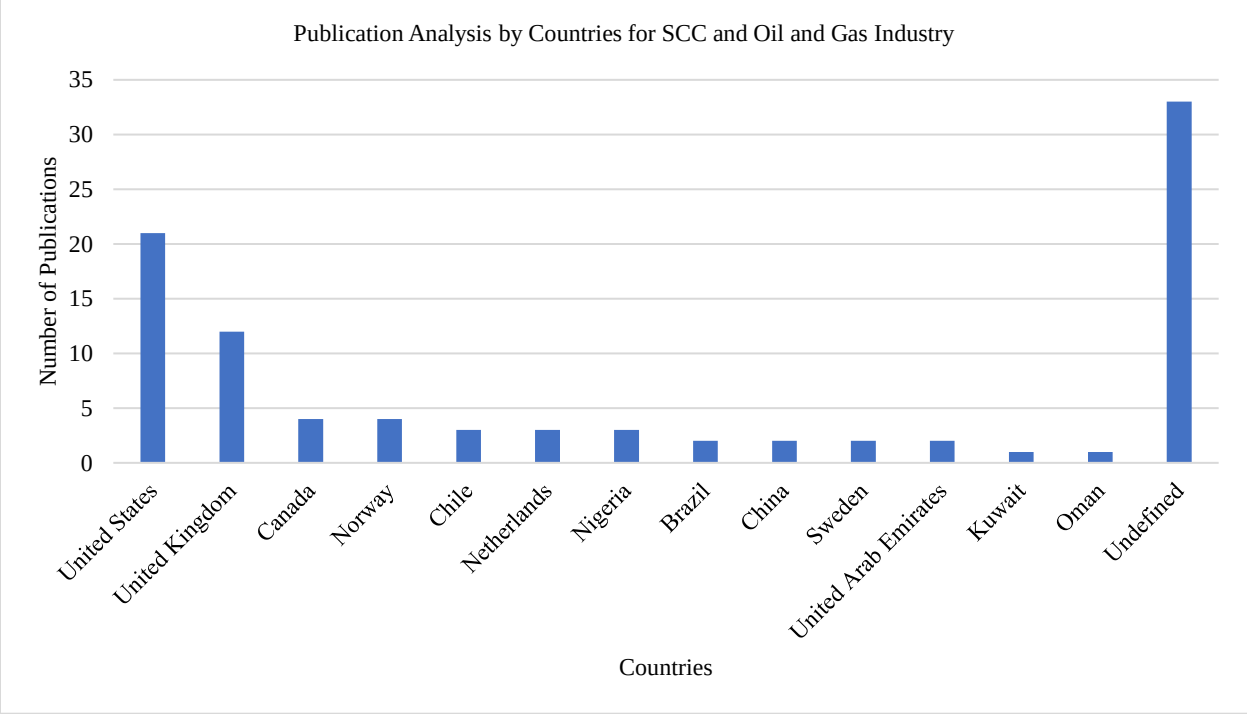

Figure 2-10: Publication Analysis by Countries for Supply Chain Collaboration and Oil and Gas Industry

2.6 The Impact of Supply Chain collaboration on supply chain performance In Oil and Gas Industry

The empirical research by Gezdur and Bhattacharjya (2017), pointed out that collaboration is enhanced through digitising the supply chain activities in the oil and gas industries to manage uncertainties and effectively improve the industry's overall performance. Swatton et al. (2009), pinpointed that collaboration allows oil and gas firms to achieve their technological enhancement and goal, contributing to performance improvement of industry supply chain activities. Prior research noted collaboration between the supply chain partners of the natural gas and renewable energy industry to integrate to construct effective energy storage facilities and hybrid power plants (Wood, 2020). According to Munim et al. (2022), the adoption process of the oil and gas industry operations is mainly influenced by three sub-criteria: a lack of technological skills, a lack of collaborative supply chain, and a reduction in operational costs. Also, the research analysis by Piya et al. (2022), proves that Supply chain resilience in the oil and gas industry is aided by

collaboration and information sharing, which promotes innovation, builds trust among supply chain partners, and raises their visibility. It has been concluded that a stronger collaborative supply relationship between the various entities in the oil and gas sector is essential to sustaining profitability. Businesses must collaborate to integrate upstream and downstream flows of goods, services, and information to decrease costs and waste and sustain profitability (Ugolo, 2021). Ugolo highlighted that Lean supply chain management methods, practises, and collaboration is crucial to the oil and gas industry's competitiveness and long-term profitability. Supply chain partners and stakeholders (owner, operator, fabricator, and steel producer) should collaborate more closely along the supply chain to reduce manufacturing, assembly, and installation costs. An inexpensive technique to improve supply chain design and process is collaboration. It improves supply chain communication and process effectiveness Leihn (2003).

The investigation done by Sarfaraz et al. (2022) noted that supply chain collaboration is among the feature strategies of supply chain management used to improve supply chain performance of the Iran oil and gas industry. Supply chain collaboration helped PIECA members in peer reviews and holding workshops with engineering, procurement, and construction contractors and field service businesses to investigate human rights concerns in the oil and gas supply chain industry. In addition, the ability to resolve human rights concerns through collaboration in the oil and gas industry contributes to performance improvement (Murphy et al., 2020). Another researcher contributed that a practical supply chain management approach reduces organisational uncertainty and improves the overall performance of the oil and gas industry in Iraq. Also, Information sharing, decision making, and risk and reward sharing are all aspects of supply chain collaboration that significantly impact the supply chain performance of the Iraq oil and gas industry (Al-Douri, 2018). Dell and Hart (2014) found that supply chain collaboration helps partners improve sustainability and operations of the oil and gas supply chains.

The study of Piya et al. (2022), concluded that collaborative supply chain strategy and information sharing are the enabling factors used to influence the level of supply chain resilience, trust, innovation and flexibility in a given supply chain network of the oil and gas industry. Ugolo (2021), stated that sustained profitability and performance improvement of most oil and gas industry collaborators is achieved through an effective collaborative supply chain strategy. Effective collaboration is used to avert the avoided supply chain uncertainties. In order to optimise

resource management, increase industrial value, and promote social welfare, enterprises should fully engage in information and knowledge exchange and strategic and logistics collaboration, as outlined by W. Liu et al. (2020). Furthermore, information technology in the oil and gas industry delivers a corporate cloud solution that promotes effective collaboration, agility, and transparency across the supply chain operation, contributing to performance improvement (McMullen, 2020). In conclusion, the researchers noted that it had been established that supply chain collaboration leads to effective performance systems in an organisation and the oil and gas industry.

2.7 Review of Supply Chain Management Theories

It is academically essential to fit in studies within existing literature and theories of the related field. This chapter presents the theories and discussions on how it has been applied previously by researchers in management, particularly in the context of supply chain collaboration. These theories serve as lenses to aid a meaningful understanding of the topic under investigation: **Resource Dependence Theory, Transaction Cost Theory, Systems Theory and Network Theory**.

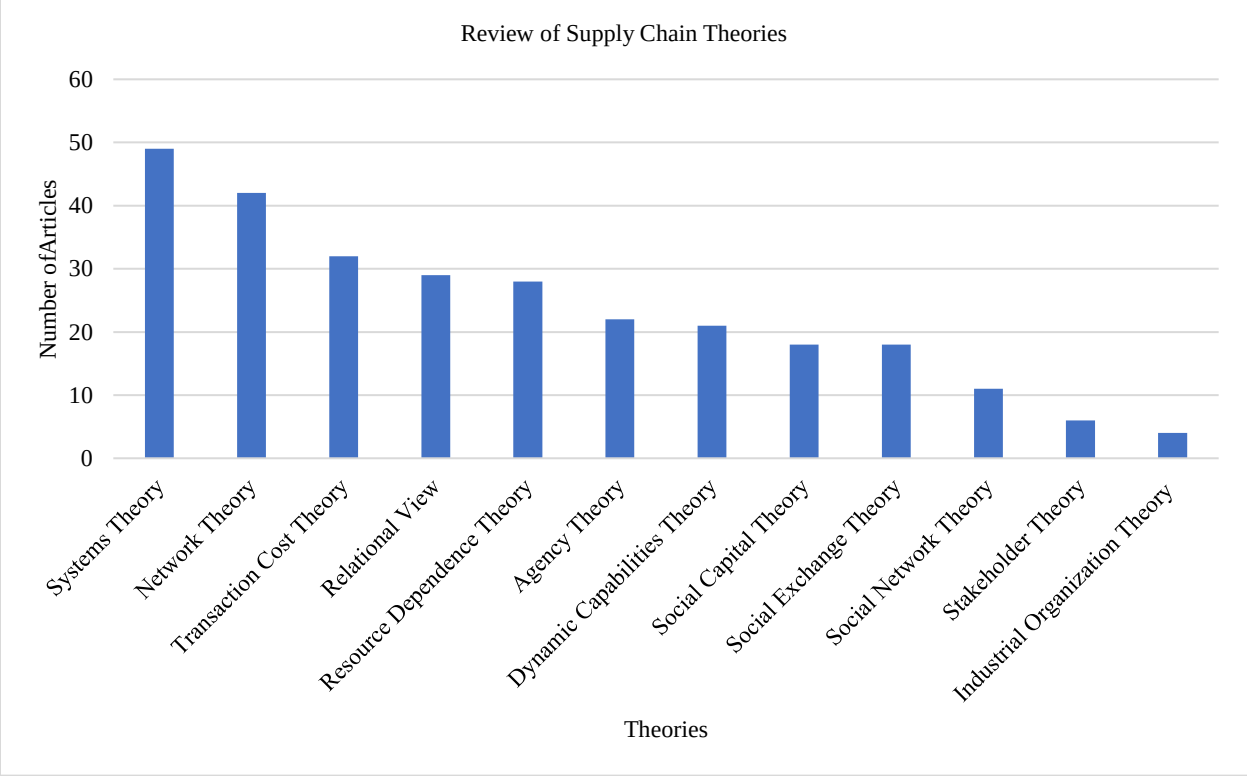

Figure 2-11: Review of Supply Chain Theories

Figure 2-11 highlight the twelve research theories that contribute to effective supply chain systems as well as leading to performance improvement in an organisation. The chart further expressed that resource dependence theory, transaction cost theory, system theory and network theory are most commonly used theories in supply chain activities. While stakeholder theory and industrial organisational theory are the less used theories. The researcher resolved to used resource dependence theory, transaction cost theory, system theory and network theory for the purpose of this research due to their impacts on resource and relationship management, networking, and cost management.

The rationale behind the section of the four theories out of twelve was based on how related they are to organisational structure. For example, a successful organisation aims to improve performance through effective cost minimisation, effective utilising of resources, promoting teamwork, and flexibility that allows flow of input and output and which they are covered in the selected theories of management. Table 2-9 presents the supply chain management theories and their sources as well as little description about each theory.

Table 2-9: Review of Supply Chain Theories and their Descriptions

Supply Chain Management Theory	**Description**	**Citation**
Transaction Cost Theory	Transaction cost theory outlines why and where organisations should participate in markets. It perceives society as a network of transactions in a market or an organisation. Although it is assumed that increased competition will improve the effectiveness of market mechanisms, market failures and transaction costs cause more business to occur within the confines of existing organisations. For instance, Subramani (2004) proposes a model that employs transaction cost theory to relate suppliers' adoption of supply chain management systems to benefits. Subramani establishes a connection between the buyer and the supplier relationship.	Chao et al. (2013); Ellram (1991); Kim and Fortado (2021); Klein and Pereira (2021); W. Liu et al. (2022); Miri-Lavassani et al. (2009); Sakuramoto et al. (2019); Schmidt and Wagner (2019); Subramani (2004)
Resource Dependence Theory	According to resource dependence theory, corporations cooperate because they can't afford all the resources, they require to be effective. This technique allows micro and small enterprises to compete with larger ones by increasing scale, bargaining power, and marketing quality.	Chand and Tarei (2021); Kalaitzi, Matopoulos, Bourlakis, et al. (2019); Kalaitzi, Matopoulos and Clegg (2019); Kim and Fortado (2021); Klein and Pereira (2021); Krolikowski and Yuan (2017); Spieske et al. (2022); Xiao et al. (2019); Zhou et al. (2020)
Systems Theory	Recent research has shown that Systems theory supports many disciplines, especially supply chain management. Applying system theory as a theoretical foundation helps to bridge the gap between the reflection of real-world systems and the identification of the relationships between them, which in turn enriches specialised fields through systemic innovations. A recent article describes coordinating and integrating processes	Fawcett, Waller, et al. (2010); Jaradat et al. (2017); J. Liu et al. (2020); Mangla et al. (2021); Siawsh et al. (2021); Yang et al. (2019); Žákovská (2015)

	using system theory to achieve company-customer satisfaction. System theory process optimization improves corporate performance and goal attainment.	
Network Theory	Network theory is a major procurement and supply chain management frameworks developed in recent decades. Network theory studies graphs representing symmetric or asymmetric relations between discrete objects. Business relationships between organisations and their suppliers, clients, and buyers are typically described using network theory.	Herrera et al. (2020); Imran et al. (2020); McFarland et al. (2008); Neilson et al. (2018); Ojha et al. (2018); Soares et al. (2017); Trienekens and Beulens (2001); Wichmann et al. (2015)
Stakeholder Theory	Stakeholder Theory emphasises the interwoven interactions between a firm and its customers, suppliers, employees, investors, communities, and other stakeholders. This philosophy further states that a company should generate value not just for its shareholders but also for all its different stakeholders. Stakeholders are groups or individuals whose actions influence or are affected by the organisation. Stakeholder theory says organisations develop externalities that influence internal and external parties. Stakeholder theory helps define who the stakeholders are. The theory's primary goal is to clarify why it's crucial to consider factors beyond monetary gain. According to this theory, recognising a stakeholder involves a company's principles and ethics.	de Camargo Fiorini et al. (2018); Durmaz et al. (2021); Freemann (1984); Mirzabeiki et al. (2021); Ojha et al. (2018); Susanto and Othman (2021); van Weele and van Raaij (2014); Yousefi and Mohamadpour Tosarkani (2022)
Dynamic Capabilities Theory	Dynamic capabilities theory allows businesses to consolidate, mobilise, and modify resources and capabilities to react to rapid change. Consequently, Dynamic capabilities theory allows an organisation to adjust its strategy and resources to achieve competitive advantages and improved performance in quickly changing conditions. The dynamic capabilities theory originated from the resource-based view's failure to interpret the development and regeneration of resources and capabilities in dynamically changing situations. Recent studies have shown that Dynamic capabilities theory can provide a competitive edge to collaborating partners. Dynamic capabilities theory can offer a competitive advantage to collaborative partners. However, the resource-based view theory has several flaws, some of which were addressed by introducing a new approach known as dynamic capabilities theory. Dynamic capabilities theory describes path-dependent processes that allow organisations to adapt to rapidly changing environments by constructing, integrating, and reconfiguring their resource and capability portfolios.	Bleady et al. (2018); Chkanikova and Sroufe (2021); Chowdhury and Quaddus (2017); Fosso Wamba and Akter (2019); Govindan (2018); Shahzad et al. (2020); van Weele and van Raaij (2014)
Relational View	The relational view is a theory in supply chain management that uses networks and dyads of firms as the unit of study to shed light on the origins of relational rents or the superior performance of individual firms that arise in a given supply chain network. In addition, the relational view enhances knowledge and information sharing and boosts the level of relationship between the buyers and suppliers of an organisation. According to the relational view of the organisation, knowledge-sharing procedures are a source of value in buyer-supplier partnerships. These routines involve communication and information sharing, which builds supply chain collaboration. The performance of a supply chain has been shown to depend significantly on relationship mechanisms. According to the relational view of the firm, a company's competitive advantage stems mainly from the quality of the relationships it maintains with its customers and suppliers.	Arora et al. (2021); Chang et al. (2012); Fawcett, Magnan, et al. (2010); Iyer et al. (2019); Sharma et al. (2022); Zacharia et al. (2011)
Social Capital Theory	The social capital theory holds that social relationships can contribute to the advancement and accumulation of human capital. Relationships among individuals who live, and work together make up a society's social capital and make it possible for that society to run smoothly. It requires people to have strong bonds with one another and agree on things like who they are and	Chiu et al. (2013); Lu et al. (2018); Machalek and Martin (2015); Min et al. (2008); Nguyen et al. (2021); Shin et al. (2019); Wichmann et al. (2015)

	what they value as a group so they can work together effectively. Social capital measures the value of tangible and intangible resources and the impact ideal creators have on relationships and groups.	
Agency Theory	In the setting of conflicting interests between principals and agents, agency theory examines the delegation of tasks from principals to agents. Agency theory tackles disagreements over goals and risk aversion. Organizational control and management systems can benefit from the framework provided by agency theory. In situations where one party has the power to assign tasks, but another party is responsible for carrying them out, Agency Theory delivers guidance on how to set up the relationship for maximum efficiency. A management and economic theory called "agency theory" aims to explain how relationships and self-interest work in businesses, and it explains and resolves difficulties between corporate owners and agents. This is often the connection between shareholders acting as principals and firm executives acting as agents.	Beal Partyka (2022); Kummer et al. (2020); Linder and Foss (2013); Luo et al. (2017); Omta et al. (2001); Susanto and Othman (2021); Tan (2014)
Industrial Organization Theory	The core analytical feature of industrial organisation theory is used to discover strategic alternatives to manage enterprises' supply in their various industries. Industrial organisation theory looks beyond individual businesses to analyse entire industries. Another researcher added that the industrial organisation theory is concerned with a business's entire industry and market conditions. Above all, the industrial organisation theory enables top management and supply chain partners to make effective decision and policies that governs the industry activities.	Dugoua and Dumas (2021); Fawcett, Waller, et al. (2010); Omta et al. (2002); Raible (2013); Trienekens et al. (2003)
Social Exchange Theory	Social exchange theory is one of the significant conceptual models in organisational behaviour and comprehending workplace behaviour. Most theoretical academics concur that responsibilities are created through a series of events during the social transaction. Furthermore, social exchange theory emphasises that interdependent transactions can build high-quality relationships only under particular conditions. Social exchange theory explains how social interactions are formed, sustained, and ended. It is focused on the idea that a relationship between two individuals is formed through cost-benefit measures. In other words, it's a scale created to evaluate the work an individual puts into a one-on-one relationship. In particular, social exchange theories can shed light on people's interpersonal and professional relationships. In addition, these ideas can be used to comprehend interactions between people or social groups within a particular environment.	Ambrose et al. (2010); Barua (2022); Geng et al. (2017); Kembro et al. (2014); Psychology (2022); Raible (2013); Susanto and Othman (2021); Zhang et al. (2019)
Social Network Theory	Social network theory maps and investigates a group's relations. Relationships can symbolise friendship, communication, workflow, or the trade of organisational products among the supply chain partners. Also, the researchers use this theory to identify and reveal the level of relationships among the supply chain participants. Social network analysis describes and analyses the interconnections of supply chain network nodes. Social network theory examines how social links convey information, influence media, and modify behaviours. It equally helps managers map informal communication channels and workflow networks. Social network theory helps managers map, oversee, and influence social networks. Organisations leverage social networks to identify collaborative supply chain opportunities.	Carter et al. (2007); Chang et al. (2012); Cheung et al. (2020); Lu et al. (2018); Mirzabeiki et al. (2021); Schoenherr et al. (2015); Soares et al. (2017)

2.7.1 *Resource Dependence Theory*

Resource Dependence Theory aim to minimise an organisation's over-dependence on suppliers of its most needed products. Instead, organisations should create effective relationships that help them respond to customers' demands and maximise profit. The resource dependence theory emphasises relationships based on the effective and efficient exchange of resources among the supply chain partners (Pfeffer, 1987). The theory recognises that an organisation cannot be entirely a supplier of its own and they needed resources for production, which implies that it is dependent on materials from other organisations (Emerson, 1962). It highlights power imbalances that can occur when, for example, one organisation depends on another for essential inputs that it cannot receive elsewhere. It also promotes collaboration across organisational boundaries and focuses on cost management of the supply chain partners. Resource dependence theory has been proven to be helpful in various applications within a supply chain framework (de Camargo Fiorini et al., 2018; Hazen et al., 2016). The resource dependence theory is important in effectively managing organisational relationships, operations and resources by providing the enabling guide and analysis of performance to achieve the desired goals and objectives (Pfeffer & Salancik, 1978). It seeks to provide the enabling environment for organisations to effectively and efficiently exchange resources, improve relationships with suppliers, manage uncertainty, and balance dependency in transitions (Heide, 1994).

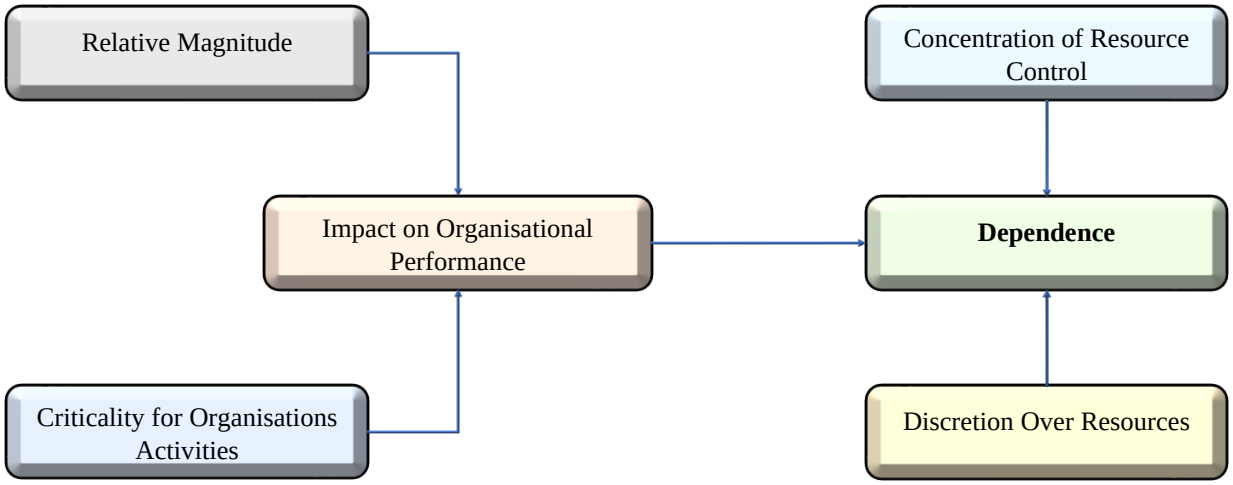

Figure 2-12: Resource Dependence Theory

Source: Adopted from Delke (2015).

Resource dependence theory is instituted on value creation which helps organisations to achieve their goals and objectives by acquiring the needed materials for operation at low costs and within a conducive environment which ensures quality delivery and minimises uncertainty (Pfeffer & Salancik, 1978).

Recent research has proved that Jeffrey Pfeffer and Gerald R. Salancik initiated this theory in the 1970s (Pfeffer & Salancik, 1978). The key idea of resource dependence theory is that an organisation must engage in a transaction with another organisation within the same environment to acquire its needed materials for production, which create a need for collaboration of organisations to achieve the desired outcome and improve performance. It is important to note that resources are essential for the effective operation of any organisation, which implies that an organisation can achieve its optimal performance when it can meet its customer's demands timely and at a low cost.

Pfeffer, in their revised edition of his book, says that,
"Resource dependence was originally developed to provide an alternative perspective to economic theories of mergers and board interlocks and to understand precisely the type of inter-organisational relations that have played such a large role in recent 'market failures".
*(*Pfeffer & Salancik, 2003*).*
The theory is effectively managed on three fundamental ideas: social context matters, organisation autonomy strategies, and the pursuit of interests and power. This theory explains the importance for organisations to understand how to operate with their internal and external sources or collaborators. Organisations seek to have the power to control resources and maximise profit by operating at low costs (Pfeffer & Salancik, 2003).

Contributions of Resource Dependence Theory in the Supply Chain

The resource dependence theory has been applied in management, specifically in the supply chain, to enhance effective decision-making, acquisition and merger, management of uncertainty and environmental control interconnected by trust and power (Ireland & Webb, 2007).

The resource dependence theory can be unfolded into core components which include decisions on whether to make or buy, the sourcing strategy, the selection of suppliers and the long-term contract strategy to understand how it is applied.

Make or Buy

Organisations engaged in production found it difficult for effective decision-making about whether to make or buy the needed materials due to uncertainties surrounding the organisational environment. The resource dependence theory provides in-depth knowledge for organisations to determine whether resources should be internally insourced or obtained from external suppliers. The decision to make or buy is very strategic for any organisation for effective action, which can be realised by accurate forecasts of demand and the capacity to respond accordingly. It is implied that an organisation must rely on other organisations for its limited resources to be operational. As a result, to avoid becoming overly reliant on external suppliers, an organisation either produces its resources internally or forges strong partnerships with other organisations that share their vision for success (Aldrich & Pfeffer, 1976).

The resource dependence theory employs the vertical integration approach, which means that organisations' supply chains principally rest on the effective sourcing of resources. Buying organisations' trust in suppliers influences the confidence and decision to make or buy (D. Malatesta & C. Smith, 2014). Shook et al. (2009) recognise two key components that constitute the decision-making process of making or buying. The first step looks at the decision-making process by examining and evaluating how crucial the resources are to the organisational operation and success. The second step considers other alternative resources and their availability within the environment of the host organisation. Consequently, dependency plays a role when there are few suppliers and a lack of alternative resources, leading to organisations depending heavily on their suppliers for the scarce resource needed for production. Nienhüser (2008) suggests that buying organisations can increase their control over supplying organisations by minimising dependence on external suppliers of materials and developing the production of the needed resources internally. This decision provides control, effective resource management and stability, which help organisations to actualise the desired outcomes and improve performance (Handfield, 1993; Handfield & Bechtel, 2002).

Sourcing Strategy

This strategy considers the capability and barriers within the business environment which affect performance. The strategy is important in the organisational environment as it has useful tools that help analyse the importance of each resource in an organisation's operation, including leverage items, strategic items, non-critical items, and bottleneck items. The sourcing strategy enables an

organisation to identify these items, represented in the two-by-two matrix (Kraljic-matrix; Garzon et al., 2019). Applying the Kraljic-matrix can influence decision-making in the supply chain based on the strategic sourcing process and the importance of resources in need, urgency and timeframe (Kraljic, 1983). Kraljic (1983) in the two-by-two matrix, present the profit impact levels and supply risk levels which help the buyer's and suppliers' relationship, as shown in Figure 2-13.

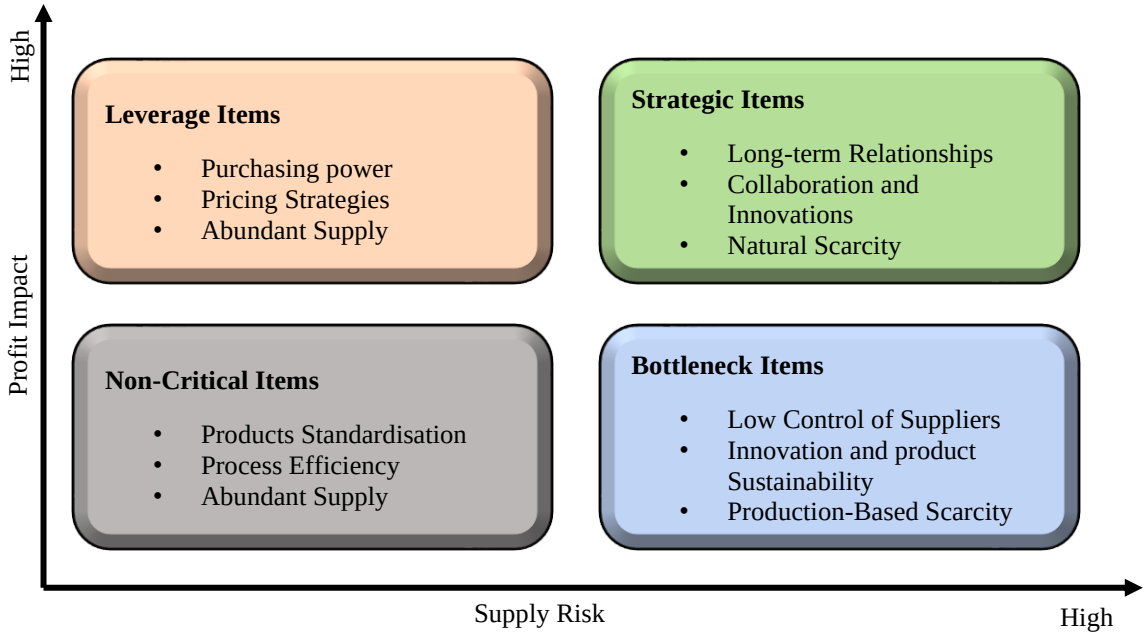

Figure 2-13: Dimensions and categories in the Kraljic matrix
Source: Adopted from Kraljic (1983) *and* Montgomery et al. (2018).

The benefits and weaknesses of sourcing strategy are that it provides the long-term relationship needed by an organisation to operate with its suppliers by failing in the area of good governance due to organisational confidentiality of information leading to a lack of transparency and accountability in the system to effectively manage the collaboration (Casciaro & Piskorski, 2005).

Resource dependence theory showed that less valued resources with little impact on organisational performance could be sourced when needed without buffer or inventory to use sourcing strategy efficiently. The viewpoint of the theory is that effective utilisation of sourcing strategy helps organisations to source for products that are scarce and mostly needed to keep the operation of an organisation and, in so doing, lower the dependency of organisations on their suppliers (Kraljic, 1983). The leverage resources under resource dependence theory have high values and a higher impact on organisations' effective performance, which should be prioritised.

Some resources seem to be scarce but have numerous suppliers available. Therefore, a sourcing strategy suggests that organisations should employ an effective sourcing strategy when sourcing for this type of resource and focus on cost minimisation to maximise profits and quality because product availability is not the problem (Kraljic, 1983).

Bottleneck products are classified as having limited or one supplier, which has a low financial effect on the organisation and may affect the operation and performance. Consequently, it is crucial to understand that the product supplier is crucial for an organisation's effective operation; therefore, robust collaboration between buyer and seller is vital. Furthermore, to reduce buyers' over-dependence on suppliers, inventory or buffer stock is required, which has been helping the organisation in overcoming supply chain issues (Kraljic, 1983).

Sheppard (1995) proposes that partnerships of an organisation should consider achieving a balanced flow of products from suppliers through resource dependence approach to the delivery of key products for survival. Nevertheless, Shook et al. (2009) employed resource dependence theory, considered using a strategic sourcing approach and revealed that bottleneck products are significant to an organisation's operations and performances. Such products may have few suppliers in the market. Therefore, an organisation can consider this approach to achieve an effective and efficient flow of resources with an emphasis on long-term partnerships, which help reduce uncertainty in the chain. However, dealing with critical resources with few resources may result in supplier dependency. Therefore, the buyer must explore collaboration and partnership with other relevant stakeholders, merging or having a joint venture, or continue procuring in the same way (Ranga et al., 2019; Williams & Lilley, 1993). A partnership or merger increases the organisation's access to needed materials and products according to Hillman et al. (2009). Caniels and Gelderman (2005) state that resource dependence theory has been applied in organisation decision-making, which helps create a robust relationship among parties, and reduces transaction and operation risk in the supply chain, organisation uncertainties and purchasing power.

The key implication of resource dependence theory in the supply chain is that it reduces the number of suppliers, which could lead to a higher dependency through partnerships. On the other hand, closer partnerships could result in a higher level of information sharing in the supply chain, which is crucial in reducing uncertainty in the supply chain (Handfield, 1993).

Suppliers Selection

Supplier selection exists under different conditions, which entirely depends on an organisation's choice to select from a range of suppliers based on their criteria to achieve the desired or intended goals and objectives. An organisation can choose a strong or weak supplier to supply its critical products for operation. In this study, a strong supplier is referred to as one that can deliver products in good quality, timely and in expected quantities (Aouadni et al., 2019). A weaker supplier may be referred to as a supplier with little capability to deliver. They are sometimes controlled or influenced by the buying organisation, and supply is always in batches due to a lack of capacity but is always available and sometimes cheaper (Aouadni et al., 2019).

Additionally, the supplier's selection strategy helps manage uncertainty by identifying small or local suppliers with simple processes and is flexible in delivering on time and at a low cost (Aouadni et al., 2019). Conversely, in the supply chain, the interdependency of organisations or buyer-supplier relationships is a challenge, especially when it involves powerful actors who tend to negatively to some of the organisations in partnership as demonstrate by Caniels and Gelderman (2005). Sometimes the organisation shift its uncertainties of purchasing organisation to suppliers, which in most cases results in a loss from the end of the supplier and also hinders its effective performance from achieving the competitive advantage due to risks and uncertainties associated with the transaction (Walker & Weber, 1984).

For example, the selection of effective suppliers, the size, nature of sourcing items, the priority of the product to the organisation and the scarce nature of the resources is very important to consider (Pfeffer & Salancik, 1978). According to Verma and Pullman (1998), the component to be considered when selecting suppliers include quality, affordability (cost), time and the flexibility to deliver. Dependency, in some cases, results in a monopoly in the supply chain when there are one, or very few, suppliers of the product in the business environment, and this often emerges as a result of a lack of partnership and collaboration among parties in the supply chain (Hillman et al., 2009).

Effective supplier selection focuses more on reducing suppliers in the supply chain and on the core ones to maximise profit and improve performance. However, it is important to recognise that the selection of fewer suppliers increases the suppliers' power and makes a greater dependency on the buyer (Florez-Lopez, 2007).

The resource dependence theory suggests that businesses should utilise transparent and efficient strategies for the supplier's selection and management to prevent dependency imbalances. Based

on the buyer-supplier relationship in the supply chain, the buyer has the ability or power to choose a supplier, whether from the influential or weaker ones. However, the prime factor in business is to reduce too much dependency. However, the selection should be carefully executed because the selection of a powerful or a weak supplier could result in exploitation or misuse, which may negatively impact the established relationship between the buyer and supplier (Caniels & Gelderman, 2005). Effective partnerships, alliances and mergers, or joint ventures may help organisations reduce uncertainties and higher dependency on business operations through vertical integration (Galbraith & Stiles, 1984).

Just-In-Time is importance in the supply chain as it provides the strategies for effective and timely delivery most used by many manufacturing organisations. Manufacturing organisations employed Just-In-Time approach as a supply chain strategy which helps in the reduction of inventory and effective management of resources leading to customer satisfaction (Handfield, 1993). Just-In-Time can be effectively utilised in a business where information sharing is the priority which drives the operation and performance of buyer and supplier. When used as a sourcing strategy in the supply chain, the Just-In-Time methodology decreases transaction risk while simultaneously increasing the buyer organisation's reliance on product suppliers to produce on time and to the agreed-upon quality (Handfield, 1993).

Long-Term Contracts Strategy

Long-term contracts bring together two or more organisations into a partnership which could be buyers or suppliers coming together to achieve a common goal. A long-term contract is employed in an organisation, particularly transaction activities, to uncertainty, and its emphasis is on creating a robust relationship which will stand the test of time or be sustainable (Handfield, 1993). Furthermore, the effective use of resources dependence theory in the organisation's operation act as a tool for reducing organisational uncertainties, which may negatively impact the organisation's performance through efficient partnership. Therefore, the key factor in managing and maintaining a relationship is establishing a long-term contract, which includes mergers, alliances and joint ventures while upholding diverse identities (Casciaro & Piskorski, 2005; Williams & Lilley, 1993; Yu et al., 2019). Additionally, in such arrangements, interdependency plays a key role in the buyers' and suppliers' relationships, which can be sustained by the adequate flow of information (Caniels & Gelderman, 2005).

The resource dependence theory recognises and suggests that the relationship is the mechanism for buyer-supplier collaboration, which is necessary for an effective partnership for both parties. The contract strategy employed in buyer-supplier relationships largely depends on the joint venture's size, resource type, and power of control (Handfield, 1993). Resource dependence theory presents the fundamental concepts when dealing with long-term contracts; a long-term contract should focus on meeting customer demand which is essential for business success. The organisation should aim at having enough capacities to enable the effective delivery of products timely. The parties involved should develop robust measures to reduce risk and uncertainties to improve performance, and inventory should be effectively managed (D. Malatesta & C. Smith, 2014; D. Malatesta & C. R. Smith, 2014; Slowinski et al., 2009). Table 2-10 Summarise Resource Dependence Theory for Supply Chain Decisions.

Finally, the author of this study analyses several opinions of extant research on the resource-dependent theory, reveals the related views in the literature reviewed and accepts the opinion to be in line with this study's direction. Therefore, the resource dependence theory will be applied to examine further supply chain collaboration in improving performance in Nigeria's oil and gas industry.

Table 2-10: Summary of Resource Dependence Theory for Supply Chain Decisions.

Supply Chain Decision Making Points				
Resource Dependency Theory	Uncertainty	Dependence	Problematic	Improvement Strategy
Make or Buy	Acquiring resources from external suppliers increases uncertainty	Closer relationships in order to reduce uncertainty	High irregularity in the power level in buyer – supplier relationships could lead to uncertainty	A well-made governance can reduce uncertainty by contracting
Sourcing Strategy	Internal production of resource could reduce uncertainty	High dependence on fewer suppliers in case	Selecting more powerful suppliers	Long-term contracting will increase dependence

		of supply base reduction	will increase dependence	
Supplier Strategy	The make or buy lead to predicament between increasing dependency to reduced uncertainty	Uncertainty can be reduced by implementing closer relationships, leading to higher dependency	A higher irregularity of power between supplier and buyers could lead to mix-up	Contracting to reduce uncertainty could lead to higher level of dependence
Awarding Contracts	Make critical resource with higher supply uncertainty. Buyer non-critical resources with low supply uncertainty Strive for all alliances for non-critical resources with high supply uncertainty	Selecting a resourcing strategy based on a products portfolio analysis. Strive for a bigger supply base for leverage and bottleneck items and smaller supply base for routine and strategic items	Selecting equally powerful of slightly weaker suppliers, in order to keep a strong bargaining position and reduce the risk of mix-up	Matching contractual framework with suppliers and product characteristics. Use long term contracts to manage close organisational relationship

Source: Adopted from Pfeffer and Salancik (1978)

2.7.2 *Transaction Cost Theory*

Transaction cost theory focuses more on organisations' connections and integration with each other in the supply chain to achieve common goals and intended or desired outcomes, from customers to suppliers and suppliers to consumers. Transaction cost theory was developed by Ronald Coase and has changed over time; it has been applied in several sectors, fields and organisations (Pitelis & Wahl, 1998). Transaction cost theory is one of the popular theories in supply chain management, which help and has contributed to the successful investigation of the organisation's supply chain activities (Ning & Baowen, 2008; Williamson, 2008a, 2008b). Williamson (2008b) research on the impact of transaction cost theory suggests that an organisation can be economically efficient

when its operations costs are greatly controlled or minimised. Any transaction in business attracts costs. Also, Transaction cost theory states that organisations need to manage, control, and monitor their operations effectively. Organisations' performance improvement largely depends on how gainfully engaged in managing and monitoring its transaction and minimising costs (internal and external) and other important processes that may help sustain the business operation (Ning & Baowen, 2008; Williamson, 2008a, 2008b).

Transaction cost theory examines how supermarkets in Bangkok and Nanjing have changed their approaches to sourcing fresh fruit over time (Ruben et al., 2007). The findings by Large et al. (2011), grounded in transaction cost theory, highlight the significance of suppliers' adaptation to sustain 3PL relationships in the supply chain process, which as a result, improves their performance in the supply chains. A recent study builds on transaction cost theory to examine how organisations leverage supply chain relational investments and technological collaboration to maintain their business relationship portfolios (Léger et al., 2006). Midttun et al. (2007) examine how transaction cost theory might assist managers in integrating corporate social responsibility throughout supply chains. It analyses prospective expansions of the "rationalist" paradigm of industrial organisation at the company and supply chain levels. Pirttila et al. (2020) examine operational working capital management within the Russian automotive supply chain using the transaction cost theory as a lens. Chao et al. (2013) also applied transaction cost theory to supply chain trust and commitment to boost the competitiveness of the hospitals through effective supply chain management.

A conceptual model for the influence of relational mechanisms and market contracts on cross-enterprise knowledge trading in supply chains is proposed using transaction cost theory (X. Zhang et al., 2012). Transaction cost theory provides diverse perspectives that lead to reconsidering standard approaches to inter-organisational collaboration (Spalanzani & Samuel, 2007). Using the idea of transaction costs, Youn et al. (2012) empirically explore the interrelationships between information sharing, information quality, mutual trust, and supply chain flexibility. Zhao et al. (2018) use transaction cost theory to construct a dependence-trust-integration model to moderate contract management difficulties in an organisation. Prior research indicates that strategic decisions and transaction cost theory exploits automotive supply chain inefficiencies (Sakuramoto et al., 2019). Transaction Cost Theory investigates supply chain resource integration to drive

company performance in an organisation (Woehner et al., 2013). Transaction Cost Theory investigates supply chain resource integration to drive company performance in an organisation (Wei & Ou, 2010). The transaction cost theory was used to study the market for nursery products in Germany as part of an analysis of supply chain management (Kaim & Mueller, 2009). An application of transaction cost theory to a study on fourth-party logistics providers as a coordinating and building agent for supply chain systems (Guojun, 2008). A chain of multiple intermediary models was created to address problems based on the supply chain management strategies through transaction cost theory for Chinese businesses in the digital economy (Yang et al., 2022).

In addition, Grover and Malhotra (2003) researched transaction cost frameworks in operations and supply chain management and proposed enhancing processes, monitoring activities, creating efficient problem-solving abilities, and building and maintaining trust and confidence with partners. This means that the supply chain process should be vital to maintain relationships between customers and suppliers, ensure the transaction's low cost is maintained to maximise profit and improve the general performance.

However, transaction cost theory has been criticised by some researchers such as Ghoshal and Moran (1996). They argue that transaction cost theory needs to sufficiently point out the control structure that could foster resourceful performance. In addition, they state that transaction cost theory needs to explain the efficacy of social controls, where the connections conform with the organisation's goals and how to limit the threat of opportunism. Also, Griesinger (1990) and Nooteboom et al. (1997) argued on the viewpoint of "trust," which some vital components of trust, such as personal relations and social customs, are underrepresented in theory, and these can play a crucial role for official contracts and business controls. Despite these criticisms, transaction cost theory is practised in numerous organisations and remains an essential theory in supply chain management and operations management (Jones et al., 1997).

The transaction cost theory's primary purpose is to serve as economic reasons for effective decision-making and promote vertically integrated organisations. This study analyses the views and ideas expressed in the literature on transaction cost theory which are in line with the direction of this thesis and will subsequently reflect on the theory as a lens to further examine the supply chain collaboration leading to performance improvement. This study suggested that the concerned

partners should apply transaction cost theory to investigate operations and supply chain management issues in the oil and gas industry.

One recent study uses transaction cost theory to comprehend better how blockchain may affect supply chain relationships, particularly regarding transaction costs and governance choices (Schmidt & Wagner, 2019). Schmidt and Wagner further noted that assets specification, transaction frequency, environmental uncertainty and behavioural uncertainty are the determining factors for governance cost and structure. Another researcher established a paradigm that suggests transaction cost savings can be realised by using Information communication technology in the entire market hierarchy and industrial value chain (Wigand, 2003). Figure 2-14 presents the framework and overview of transactional cost theory in an organisation. For further comprehensive information empirical evidences on transaction cost theory see Schmidt and Wagner (2019), and Grover and Malhotra (2003).

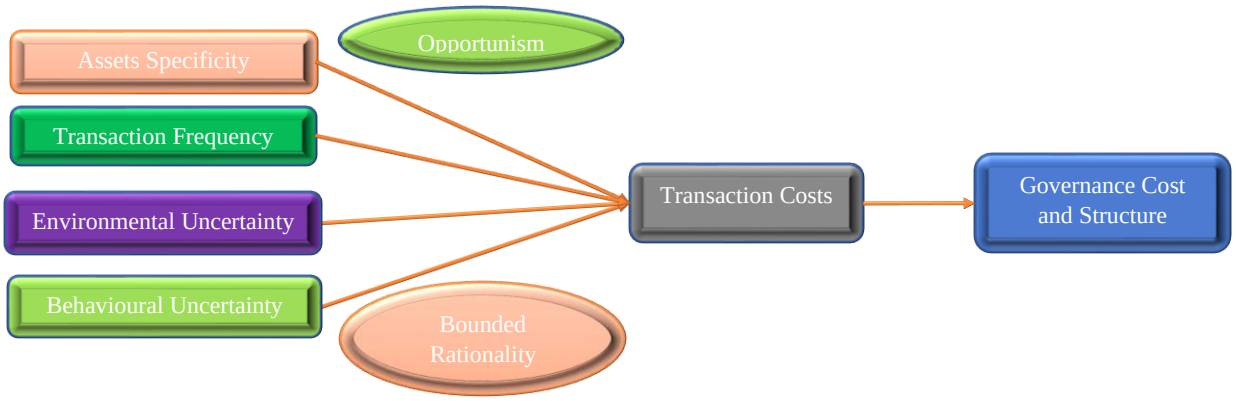

Figure 2-14: The framework of transactional cost theory
Source: Adopted from Schmidt and Wagner (2019); Slangen et al. (2008)

2.7.3 *Systems Theory*

Systems theory is the interdisciplinary theory employed in different sectors or organisations. Even though it has no universally accepted definition, it has helped understand changes in organisational operation and has impacted in many ways of performance. Testa and Sipe (2006) research systems theory and state that it helps strengthen operations and build organisational relationships by understanding the root cause of problems in the system and helps in providing effective resolutions. Table 2-11 presents the various definitions of system theories from difference scholars with their key elements.

Table 2-11: The definition of System theory and its key elements

Definitions	**Key Elements**
A scientific theory is an attempt to bind together in a systematic fashion the knowledge that one has of some particular aspect of the world of experience. The aim is to achieve some form of understanding. Where this is usually cashed out as an explanatory power and fertility.	• Binds together in a systematic fashion. • Explanatory Powers and predictive Fertility.
A unified system of laws or hypotheses, with explanatory force.	Unified System
We understand a theory as comprises two elements: 1. A population of models. 2. Various hypotheses linking those models with the system in the real world.	• Population of models. • Links to the real world through the hypotheses.
An abstract calculus is the logical skeleton of the explanatory system. A set of rules that assign an empirical content to the abstract calculus by relating it to the concrete materials of observations and experiment. An interpretation or model for the abstract calculus, which supplies flesh to skeletal structure in terms of more or less familiar conceptualised or visualisable materials.	• Logical skeleton of the explanatory system. • Set of rules. • Models for abstract calculus, which supplies some flesh for skeletal structures.
A coherent set of principles or statements explains a large set of observations or findings	• Set of propositions • explains a large set of observations

Source: Adopted from Adams et al. (2014).

In the 1950s, Ludwig von Bertalanffy contributed to the development of systems theory. During that time, several researchers were primarily focused on living organisms in the study of biology (Bertalanffy, 1956). Bertalanffy's studies of science methodology led to general systems theory. However, his studies were mainly from the mathematics viewpoint and involved classical

modelling of the system, in which he suggested that systems are affected by location size and time (Patel et al., 2018). Thus, Cellier (2001) suggested that a dynamic understanding of systems is required to examine open systems effectively.

Gripsrud et al. (2006) in the study of logistics issues in supply chain management, applied systems theory and stated that in the 1950s, the foremost theory was neoclassical economic theories which concentrated on "trade-offs" and "total cost". Systems theory became known in management in the 1970s and was applied to supply chains for better understanding of organisational operations and performance. Systems theory was considered a new direction in the mid-1980s when it was applied to examine an organisation's optimal performance. Adequate flow of products and the reduction of environmental risk and managing organisational uncertainty should be a top supply chain concern, where systems theory provide the enabling connections, relationship, and tools to achieve its goals and objectives.

An organisation is considered an open system which prioritises its goals following the needs of the environment by creating a relationship that will facilitate the supply chain, which helps the effective distribution of resources and enable it to achieve market competitive advantage. It also supports the researchers to carry out interaction and interview research to understand the root of research gaps (see Figure 2-15). Effective performance can be achieved by the ability of the organisation as a system to have a robust structure and well-defined policies. For instance, for an organisation to attain an effective and sustainable performance, it must be supported by enabling environment and ensure effective communication in the system to reduce uncertainties in the organisational operation.

The oil and gas industry are highly involved in the supply chain of its products. It is an organisation classified as an open system that involves internal and external suppliers in the context of systems theory. Therefore, organisations must utilise systems theory to identify ways to sustain their collaboration with partners by strengthening the relationship and effective communication in the system, monitoring environmental changes and ensuring lower operations costs to improve performance. Kumar et al. (2019) applied a systems theory strategy to study the factors affecting

supply chain performance and recognised the importance of customer satisfaction and the realisation of organisational goals as critical factors for performance improvement.

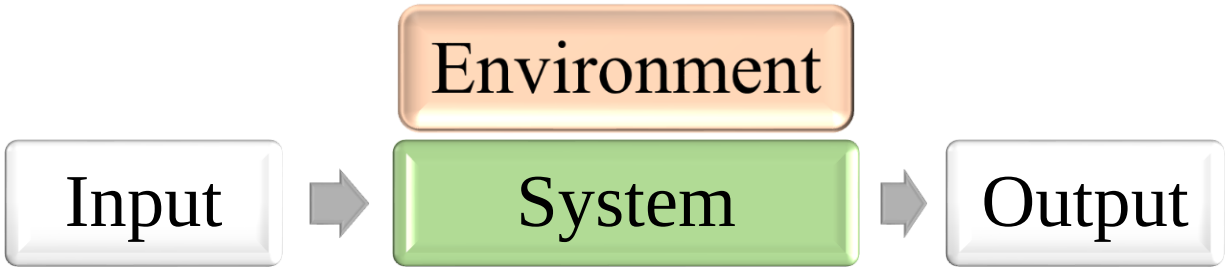

Figure 2-15: An elementary theoretical framework for open systems theory
Source: Adopted from Michalakoudis (2019)

The essential purposes of a business are the provision of value for money and the implementation of policies that will result in effective delivery. The oil and gas industry are not an exception to this. This implies that a business operates at a lower cost, optimising its resources and processes with a complete view of collaboration design. The oil and gas industry are a public organisation, specifically an 'open system' that interacts locally and globally with suppliers. However, it is crucial to recognise that systems are not static and change over time, which means that procedures and relationships also change. Therefore, it is significant for an organisation to develop its supply chain strategy and collaboration to enable performance improvement and achieve lower operating costs and competitive advantage in the market.

Therefore, the author of this thesis believes that a systems approach is suitable for investigating the adoption of supply chain collaboration as a tool for performance improvement in Nigeria's oil and gas industry. Table 2-12 discusses the characteristics of system theory and how system theory is viewed through traditional and system perspective. Further detail on the differentiation of system and traditional views of system theory can be found in the study of Kanungo and Jain (2007)

Table 2-12: System Theory: The differentiation of Systems and traditional view

Characteristic	**Traditional Thinking**	**Systems Thinking**
Overall view	Reductionist, focus is on parts	Holistic, Focus is on the whole
Key processes	Analysis	Synthesis
Types of analysis	Deduction	Induction

Focus of investigation	Attributes of objects	Interdependence of objects
State during investigation	Static	Dynamic
Basic assumption	Cause and effect	Multiple, Probabilistic causality
Problem resolution	A static solution	An adaptive system or modelling
Operation of Parts	Optimal	Sub-optimal

Source: Adopted from Kanungo and Jain (2007)

2.7.4 *Network Theory in Supply Chain*

The network theory is one of the most influential theories for procurement and supply chain management. The theory deals with the relationships between organisations, suppliers, and customers in the supply chain. In the 1930s, Jacob Moreno developed a Network theory applied to several fields of study, including Business and Management, Psychology, physic and biology (Freeman, 2004). The theory became popular in logistics and supply chains in the 1970s and 1980s by Harland C. (1996) and other authors. It fundamentally looked at organisation relationships, encouraged organisations' joint ventures and employed a strategic alliance approach to guide the supply chain process by striking a balance between the partners.

The term network defines a relationship that connects two or more organisations to achieve a specific purpose, goal and objective (Harland, 1996; Harland & Knight, 2001). Chang et al. (2012) suggested that a comprehensive supply chain network is hard to model; therefore, it only provides a direct relationship among chain members but may not encompass suppliers of the organisation's primary supplier. Thorelli (1986) states that networks connect organisations in long-term relationships with their partners. Furthermore, networks are vital to organisations' operation, which depends on organisations' resources for effective production and performance (Håkansson & Ford, 2002).

It is significant to note the potential of network theory in organisations' performance. The theory guides organisations' operations to achieve a competitive advantage and promote information and knowledge sharing within the partnership, which helps many organisations with effective decision-making (Gulati et al., 2000). In addition, the theory is relevant in procurement because it facilitates

timely decision-making among partners by effectively managing demands and suppliers' selection (Monczka et al., 2015). Also, organisations engaged in a network assure that the selected suppliers can deliver the needed products for effective and smooth production (Monczka et al., 2015). Then again, the relationships among organisations are on the basic trust, commitment, and it can result in value-added for both parties (R. Monczka, K. Peterson, et al., 1998; R. Monczka, R. Trent, et al., 1998; R. M. Monczka et al., 1998; Trent & Monczka, 1998).

Figure 2-16 demonstrated how the operations of network theory during the supply chain operation in an organisation. It further shows the connectivity and the relationship between the focal companies and their key partners.

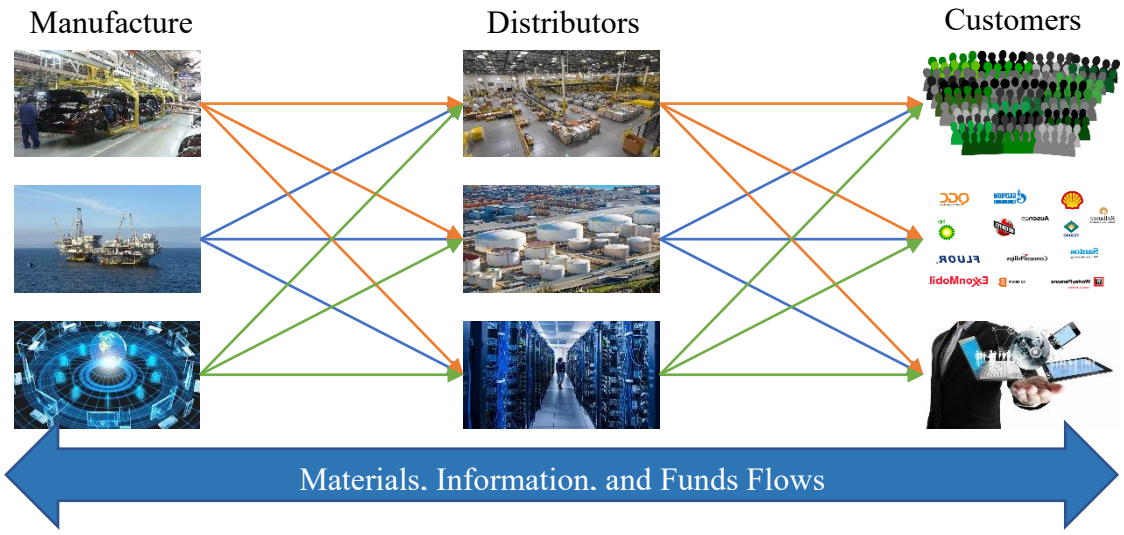

Figure 2-16: Model Assumptions for Supply Chain Network Theory Design
Source: Adopted from Imran et al. (2020) and Borgatti and Halgin (2011)

Since network theory is concerned with organisational relationships, it plays an important role in the decision-making process and collaboration of a supply chain Network. This research is pertinent because it seeks to understand and investigates what enables and inhibits effective performance systems in the oil and gas sector supply chains.

Network Theory in Supply Chain

Building organisational relationships are prioritised in the network theory's broad perspective. However, other concepts of network theory also exist. For example, networks of supply chains do not function independently (Håkansson & Ford, 2002). However, organisations in a network must

be informed of any changes in the decision-making process. This could be by involving participating partners that constitute the supply chain relationship to have smooth business conduct (Håkansson & Ford, 2002). Harland (1996) study examined the supply chain that relates to management and the structure of businesses and identified different factors significant for forming a network with other organisations. These include the selection of effective teams who are competitive and have the capacity to achieve a competitive advantage, the ability to manage, monitor and sustain the relationship effectively and having better knowledge to observe competitors in the business environment and innovation (Harland, 1996).

Håkansson and Snehota (1989) state that if an organisation engages in a network with other businesses, they agree to share communication or information and understand the operation pattern to achieve the desired outcome. The commitment that leads to information sharing and other vital collaboration elements between an organisation can be achieved by networking and connections. This is the key aspect that this study seeks to explore and understand better how collaboration facilitates organisations' performance.

According to Shook et al. (2009) network theory needs to explain when to make, buy, or collaborate with other organisations. The theory guides organisations on whom to buy, hire or collaborate with within the business environment. Similarly, Håkansson and Snehota (1989) state that

"*…some of the organisation's relationship with other organisations in the network constitute in themselves one of the most – if not the most – valuable resources that it possesses."*

The researcher agrees with the suggestion that organisations should partner with each other in search of essential materials, and the network should create a relationship that will be a significant resource. Furthermore, Network theory in the supply chain fosters trust, relationships, and teamwork, which improves an organisation's effectiveness and operations.

Other impressions of the network theory in supply chain management include the ability of organisations to come together to achieve a competitive advantage. As stated before, no organisation in a network practice an isolated operation and networks support organisations in sustaining the significance of a partnership. However, the author of this study believed in the views of network theory, particularly the creation of robust relationships for organisations which is one

of the enablers of supply chain collaboration, and performance is the main component under investigation. Miles et al. (2006) state that efforts to establish a strong and sustainable relationship should be crucial to organisations that want to collaborate with others. They should start with internal units and departmental building relationships, leading to effective overall mergers. This could be a case of an organisation getting its own house in order before becoming a partner to others. Moreover, the main factor of an efficacious network is access to resources when needed. Collaboration promotes an organisation's network by creating a healthy through teamwork and boosts knowledge sharing and effective and efficient management of resources within the supply chain (Bernardes & Zsidisin, 2008).

Furthermore, the networks in the supply chain can be achieved through information sharing among organisations which typically information on core skills needs to be shared. Therefore, organisation information sharing in the supply chain becomes problematic as several organisations can be nervous about opponents taking advantage of their best skills and resource or their weaknesses (Ballou et al., 2000). The fear of not sharing information may negatively impact the functionality of network theory, as the core aspect is subjugated (Lamming et al., 2000). Collaborations through networks are expected to be transparent, so that information sharing between parties should not lead to problems but rather enable the engaged organisations to achieve their desired outcomes or anticipated competitive advantages. Collaboration in the network includes access to resources, effective information sharing, utilisation of technology, exploring better market opportunities and effective allocation and management of resources (Gulati et al., 2000). Gulati et al. (2000) identified risk-sharing and effective outsourcing processes as the benefits of network theory and enablers that help organisations realise their goals and objectives within scope, scale, and time.

Application of Network Theory in the Supply Chain Decision

In order to assess the contribution of network theory in supply chain management, it is essential to recognise the purpose of procurement in a business, such as antecedent processes, supplier strategy and supportive processes. The procuring organisation is confronted with sensitive decision-making opinions in every process stage.

The "antecedent process" are activities outside an organisation's responsibilities and includes procurement targets and demand planning, two key inputs required for effective procurement. The

procurement targets involve sourcing, suppliers' selection, negotiation, and product delivery. The antecedent process enables the procuring organisation to control how to source the needed inputs. The procuring organisation can determine whether to obtain supplies internally or externally or to collaborate single or multiple sourcing approach, and this process can only be achieved by effective decision-making (Schiele, 2006). The demand planning process deals with the size or volume of supplies, quality, delivery time and product price, which must be considered. In order to achieve an effective supply chain, demand planning must be given priority which guides organisations in deciding to make or buy (Cousins et al., 2008; Monczka et al., 2015). This study seeks to identify the processes that help organisations achieve their goals, which are captured in the antecedent process and may be utilised to investigate supply chain collaboration leading to performance improvement in the Nigerian oil and gas industry.

The "supplier strategy" involves the contract between the suppliers and procuring organisation in terms of the suppliers' capacity and competencies to meet or fulfil the product demand (Monczka et al., 2015). The process relates to the tendering process, which includes awarding contracts, receiving quotations, negotiations, and screening of potential suppliers as part of the selection process. Before selecting a supplier, the procurer should confirm that the supplier has the capacity to deliver the anticipated result. This is to ensure the suppliers agree with the set terms and conditions of delivery based on the prescribed contract agreement and negotiation. Network theory gauges the process to ensure that activities and performance maintain the quality and cost agreed upon and put an effective delivery instrument in place to meet demand (Monczka et al., 2015).

The "supportive process" is essential to the functionality of the supply chain and the effective management of organisation operations. It does not create a product but rather facilitates the supply and distribution of the products across the business partners. In addition, the supportive process includes providing vital information for effective business planning, logistics and transport and efficient allocation of resources for smooth operations (Monczka et al., 2015).

Contribution of Network Theory to Supply Chain Management

Demand Planning

Effective demand planning gives an organisation the opportunity to make or buy its inputs, as a buying organisation may be able to decide to produce in with the environment or to source from external suppliers.

If a decision to embark on production by sourcing for resources within its environment, the organisation may face risk and uncertainties because some resources are very scarce and have fewer suppliers. Therefore, it is important to involve the network through the collaborative supply chain to reduce uncertainty and continue efficient performance in business (Choi & Hong, 2002; Gupta et al., 2000; Li & Dai, 2009).

Making an organisation tries to source inputs internally, but if the organisation has no means of making its inputs internally, it is likely to decide to outsource. (Salancik, 1995) states that many researchers of network or collaborative supply chain look at information sharing, and robust relationship leads to effective allocation of material resources, which enable organisations to be competitive in the business environment. The collaboration of focal organisations with other stakeholders in the supply chain enables a high level of information sharing, facilitating accurate demand forecasts and teamwork (Samaddar & Kadiyala, 2006). In addition, the benefits of a network in the supply chain include increased capabilities among partners, ensuring resources available for effective production and distribution, and risk-sharing (Yee & Platts, 2006). A network approach contributes immensely to organisations' procurement and supply chain process, which guides them to actualise their intended desire by allowing timely information sharing among the partners, effective distribution of resources and lowering production uncertainties and risk (Hameri & Paatela, 2005). The network theory supports businesses in collaborating in their strategic planning and reasoning and, in doing so, widens their viewpoint and to think of more than the cost associated with an outsourcing process alone (De Toni et al., 1994b).

Procurement Strategy

The procurement strategy is an opportunity for organisations to make the decision to procure inputs of value from reliable suppliers who have the competencies to deliver as required. This enables organisations to make cost savings, achieve competitiveness and respond to demand on time (Rendon & Steven, 2005).

Important resources are prioritised, and organisations try to develop and establish a network with their suppliers to supply essential materials on time to maintain production space efficiently. Similarly, to achieve effective and smooth distribution of materials, organisations explore and use supportive processes such as effective logistics and transport systems to achieve their business objectives (Bvepfepfe, 2019). This approach of a collaborative supply chain focuses on the

increasing organisation or business performance, which is the core direction of this study. The theory can be useful in examining enablers and inhibitors of supply chain collaboration leading to performance improvement in the oil and gas industry.

In a collaborative organisation, the key strategy is to ensure that organisations remain focused on their vision and objectives. This supply network strategy is thought to increase supply performance across the whole network (Harland & Knight, 2001). Furthermore, collaboration among the organisation help to eliminate monopoly, level the price of the product and promote the use of suitable transport facilities (Christopher & Juttner, 2000). According to De Toni et al. (1994a) in a collaborative supply chain, connections are not only centred on product price but also on a coordinated effort to improve demand planning, goal actualisation, and teamwork.

Supplier Strategy

Selecting suitable suppliers and making decisive decisions are significant in the supply chain network. When an organisation decides to purchase something, a list of potential suppliers can be formed. At this point, it is crucial to establish a network for a solid relationship to ensure the efficient exchange of resources and information and to achieve a competitive edge in the market (Cousins et al., 2008). It is important to note that organisations in the collaborative supply chain are obliged to keep to terms and conditions. There should be a mutual agreement from the initial network stage because it is difficult for organisations in long-term contracts to disengage.

Negotiation and Delivery Mechanisms in the Supply Chain

Negotiation is an important factor in the collaborative supply chain. Normally, a contract is awarded to a supplier after some negotiation has ensued and an agreement has been established. Different types of contracts exist in networks or collaborations, such as long-term and short-term contracts, in which the length of the contract determines the supply chain strategies to be applied. Building a supply chain network requires trust and a solid relationship between partners. This can increase performance and reduce lead times due to unfettered information flow and more transparent policies for performance improvement (Aksoy & Öztürk, 2011). The selection of suppliers considers the offer price under good negotiation and how the supplier intends to deliver the outputs in the business environment. Network theory contributes to supply chain organisation by guiding the conducts and processes for effective collaborations among organisations (Prahinski & Benton, 2004).

Network theory presents a wider understanding of inter-organisational collaborations in a business environment as it identifies the effects of collaboration and its relationships in improving organisational performance (Halldorsson et al., 2007). Network theory is also useful in finding the strengths and weakness of an organisation and suggest that business managers develop a realistic assessment plan to achieve business success and understand the implication of doing business with and without plans. Finally, the inter-organisational collaboration is a determination to accomplish resource availability and increase productivity, which are key components in the business environment (Fawcett et al., 2009; Fayezi et al., 2010; Knoppen & Christiaanse, 2007).

It is important to recognise that network theory gives much attention to the effective operation and stability of organisations which can be achieved by effective planning and good relationships between partners (Halldorsson et al., 2007). Networking in business improves performance by aligning processes, selecting qualified suppliers, and allocating and distributing resources to the concerned supply chain stakeholders (Håkansson, 1987; Harland, 1996). Furthermore, other researchers affirmed that network theory is vital in scrutinising trust and long-term bilateral collaborations (Gadde & Håkansson, 2008). The additional value of network theory is its effectiveness for supply chain innovation, which is accomplished through information and knowledge sharing and the relationships that connect organisations (Miles & Snow, 2007).

Finally, after a cautious review of network theory, the author of this thesis considers the revealed contributions and benefits of network theory are related to measures and components identified in the literature by several authors on collaborative supply chain management and benefits for achieving supply chain performance of an organisation. As a result, network theory is accepted to be applied as lenses to examine the supply chain further performance improvement in the oil and gas industry. Table 2-13 shows the decision-making for the network theory on how it is applied.

Table 2-13: Decision Matrix for the Network Theory

Theory	**Decision making**			
Network Theory Application in Supply Chain	Make or buy	Have a specific Selection strategy when sourcing product	Have a specific Selection strategy for suppliers and making an effective decision	Contracts are awarded after negotiating with suppliers and recognising strategy of delivering the result
	The level of information sharing is high when working in a chain. Ensure uncertainties in demand are clarified.	Ensure strategies are linked together. Suppliers with a good reputation are chosen.	The relationship in the chain should be trustworthy.	The chain support long term contract Partnership is highly needed.

	Precise forecast of demand Sharing of risk	Ensure suppliers are familiar with the product on demand. Transparency of operations in the supply chain Ensure information sharing on the plans, technological experience, and delivery mechanism	Value-adding between the supplier and organisation The relationship should include short- and long-term approach. Knowledge transfer should be encouraged to improve performance in the chain. - Ensure competitive advantage is achieved in the chain	-Ensure to prioritise the delivery of the product and importance of the product on demand

Source: Wellenbrock (2013)

The common organisational theories of supply chain management considered to be used as lenses for this study include resource-dependent theory, transaction cost theory, open systems theory, and network theory. Their shortcoming is summarised in Table 2-14. Table 2-14 further summarises the limitations of the author's organisation theories in supply chain management. These theories identified components of supply chain management, as well as the limitations, are similar to the inhibitors of supply chain collaboration previously identified in the literature.

Table 2-14: Application of organisational Theories in Supply Chain Management and their impediments

Theories	**Justification for application of theory in SCM studies**	**Citations**
Resource Dependent Theory	Tangible and intangible resources influence the creation, sustainability, and achievement of competitive advantage of organisations.	de Camargo Fiorini et al. (2018); Emerson (1962); Pfeffer (1987); Pfeffer and Salancik (1978)
Transaction Cost Theory	Achieve organisation efficiency and costs reduction through asset and material uncertainty. It promotes vertical integration.	Large et al. (2011); Ruben et al. (2007); Sakuramoto et al. (2019)
Systems Theory	Simplifying the relations among the components of the systems in order to gain a better understanding and analysis of values generated by the supply chain	Gripsrud et al. (2006); Patel et al. (2018); Testa and Sipe (2006)
Network Theory	It increases inter-organisational relationships and the capabilities and competencies of the resources of the individual firms	Freeman (2004); Håkansson and Ford (2002); Monczka et al. (2015)
The shortcoming of theory in describing SCM studies		
Resource Dependent Theory	It focuses only on value creation through partnership.	Hazen et al. (2016); Heide (1994); Shook et al. (2009)
Transaction Cost Theory	Very little focus on personal and human relationships among organisations in the supply chain. Although it provides inter-organisational guidelines, it pays more attention to economic costs.	Jones et al. (1997); Kaim and Mueller (2009); Pilling et al. (1994)
Systems Theory	The functional and power control view of operations is dominant.	Bertalanffy (1956); Cellier (2001)
Network Theory	The theory focuses more on integrating organisations rather than in build capacity.	Bernardes and Zsidisin (2008); Håkansson and Snehota (1989); Lamming et al. (2000)

2.8 Chapter Summary

In summary, this chapter has laid the foundation for the research on supply chain collaboration and its impact on performance improvement in the oil and gas industry. The literature review provided a comprehensive understanding of supply chain management and collaboration, highlighting the common components such as information sharing, decision making, goal alignment, commitment, and trust that contribute to effective supply chain systems across various industries. However, it was evident that limited research has been conducted specifically on supply chain collaboration and its role in performance improvement within the oil and gas sector.

The identified gap in the literature underscores the significance of this study, as it aims to bridge the knowledge deficit and contribute to the enhancement of supply chain practices in the oil and gas industry in Nigeria. By reviewing relevant theories such as resource dependence theory, transaction cost theory, open systems theory, and network theory, the subsequent chapter will further analyse the supply chain collaboration processes through different lenses, providing valuable insights into achieving effective supply chain performance.

Considering the limited existing models for supply chain collaboration and performance improvement in the oil and gas industry, this research endeavours to develop a comprehensive model that addresses the unique challenges and opportunities in this sector. By integrating theoretical perspectives and empirical findings, this study aims to contribute to the body of knowledge in both supply chain management and the oil and gas industry.

As the research unfolds, it will shed light on the enablers and inhibitors of supply chain collaboration in the oil and gas sector, providing practical recommendations for organizations seeking to enhance their supply chain performance. Ultimately, the findings of this study have the potential to inform strategic decision-making and drive positive changes in supply chain practices within the oil and gas industry.

The focus of resource dependence theory is on how organisations rely on outside resources to operate efficiently. Understanding resource dependence theory led to emphasising collaborative connections and interdependencies between supply chain participants in the context of improving supply chain performance. According to this theory, partnerships, information exchange, and

efficient cooperation between suppliers and distributors may improve the overall performance and efficiency of the supply chain.

The Transaction Cost Theory compares the costs and advantages of carrying out transactions internally against outside. This theory help guide judgements on whether to outsource activities or maintain them in-house based on elements including transaction costs, coordination costs, and hazards in supply chain literature and model building. Discussions on how to improve the make-or-buy choice inside the supply chain may result.

Organisations are seen in Open System Theory as complex systems that interact with their surroundings. In applying this theory to supply chain performance it implies that supply chains should be flexible and sensitive to changes in the market, rules, and technology improvements. Models that contain adaptability, agility, and the capacity to respond to external forces may result from an open systems viewpoint.

The study of networks and how resources and information move across them is known as network theory. This theory was applied to describe and study the structure of supply chain networks in the context of supply chain performance improvement. It might highlight the value of hubs, weak linkages, and strong ties within the network, thereby leading tactics for enhancing communication, cooperation, and information flow.

Finally, this research embarks on a critical exploration of supply chain collaboration and performance improvement in the oil and gas industry, filling a crucial gap in the existing literature and aiming to contribute valuable insights and recommendations to both academia and industry practitioners. Through this endeavour, the research aspires to advance the understanding of effective supply chain management in the context of the oil and gas sector, and in doing so, make meaningful contributions to the broader field of supply chain research.

The next chapter presents and defends research design and methods and the ethical issues of studying supply chain collaboration adoption to improve performance in the oil and gas industry.

Chapter 3 : Research Methodology

3.1 Introduction

This chapter discusses the choice of location and companies where the knowledge gap was mostly observed. The research philosophy for this study follows the procedure of research onion that was introduced by Saunders et al. (2020). The chapter will recognise the study's assumptions and provide an account of the research process and events that will transpire during the study. This part of the thesis presents the research methodology and identifies the activities of each step of the study design from the pilot study and main empirical study. This chapter will also present the data collection process and how it will be analysed, leading to findings. The study will be constructed on empirical findings and recognises the vitality of secondary data, which will help the robust and precise presentation of the study findings or outcomes. The researcher will employ qualitative methods by exploring a cross-section case study strategy, giving the researcher a better knowledge of the research topic.

Nevertheless, the researcher has chosen to study and investigate the adoption of supply chain collaboration in Nigeria's oil and gas industry because it is an area of the supply chain that many authors ignore. The researcher chose Nigeria for the study because of the underdevelopment of supply chain collaboration, particularly in the oil and gas sector; little academic research was found in the area (Figure 2-10), accessibility to participants for data collection, cost serving and time duration for the study.

3.2 Research Philosophy

The philosophy for this research will follow the process of the research onion designed by Saunders et al. (2020). The research onion gives a helpful guide and a systematic presentation of processes to fulfil the research's purpose and goals, including philosophies, approaches, tactics, choices, time spans, and methodologies and procedures that enable appropriate data collecting and analysis options.

Figure 3-1 depicts a design for the research methods that can be studied and the sets of mechanisms that can be implemented in the subsequent sections of this chapter.

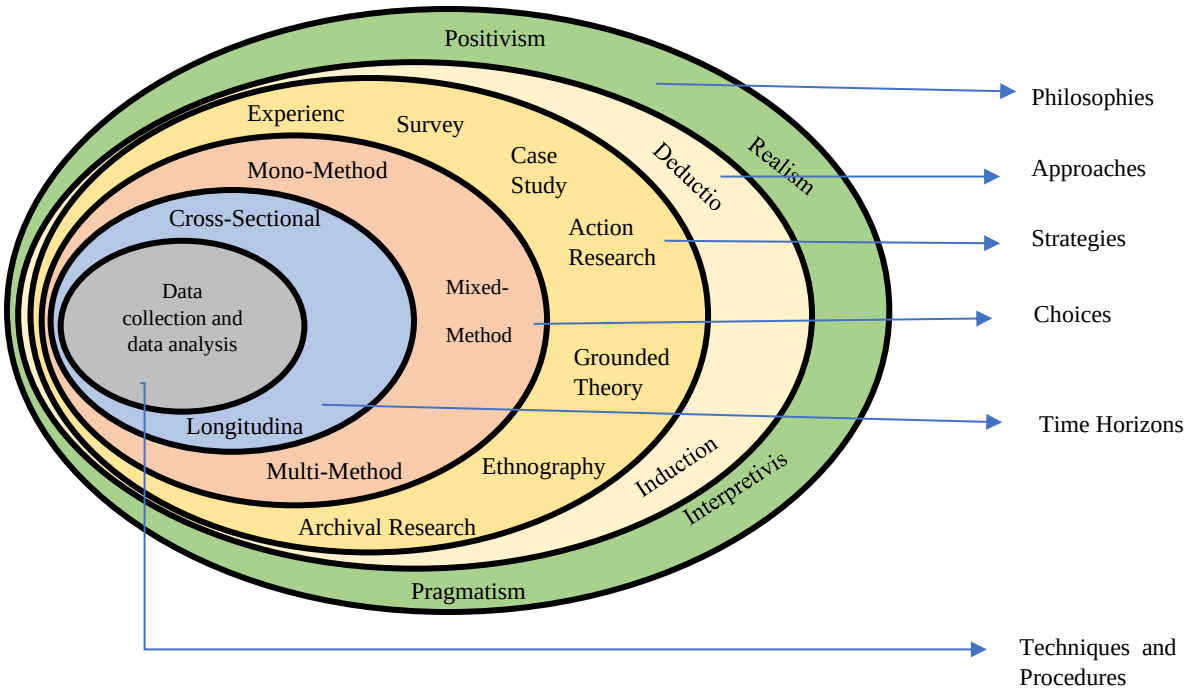

Figure 3-1: The Research Onion

Source: Adopted from Saunders et al. (2020)

The term research philosophy is a system that relies on reality and an assumption of knowledge development (Saunders et al., 2020). As mentioned in Saunders et al. study, the research onion is divided into six categories: research philosophies, research approaches, research strategies, research choice, research time horizons and finally, research techniques and procedures. The research philosophies consist of four philosophies: positivism, realism, interpretivism, and pragmatism. This interpretivism philosophy was used to identify and classify this research work within a research philosophy as it determines valid and necessary data for his study. This will make it possible for the researcher to select the approach to use and greatly aid in data collection (Creswell et al., 2007). The philosophical assumptions made by the researcher determine the method to be applied for the study, such as quantitative, qualitative, or mixed-method approach. The philosophical views reflect what the researcher recognises as the nature of reality (ontology), the basis of knowledge (epistemology), the function of values established in the research (axiology), the language utilised in the research (rhetoric), and the methods and process used in the research (methodology) (Creswell et al., 2007).

The study of Niglas (2010) presented an understanding of the adoption of research philosophy, which is more of a multi-dimensional set of varieties than separate positions. The application later

implies that studies use different philosophical fields to answer diverse research questions, meaning that researchers can assume more than one position. With these considerations, selecting a study philosophy is the responsibility of the researcher to choose based on the knowledge and process.

3.2.1 *Ontological Positions*

Ontology positions agree with the question of "what is the nature of reality?" (Alan, 2012; Bryman, 2011). Grix (2010) signposted that every researcher has understood how the world is structured and its values. Ontology is essential if the researcher understands the natural tendency of the study position (Creswell, 1994, 2014; Morgan & Smircich, 1980).

Critical views or observations about ontological enquiry are to establish whether social organisations should be entities of objectivity, in which reality is external to its social actors, or should be considered as social constructions drawn from the perceptions of social actors (Bryman et al., 2021) (Bryman et al., 2021). It is suggested that these two core differing standpoints are considered objectivism and constructivism (Alan, 2012). As shown in the views of ontology are all about the nature of the world and what is to know about it, as detailed in table 4.1.

Table 3-1: Ontological Positions of Nature and Its Realities

ONTOLOGICAL POSITIONS
REALISM An external reality exists independent of our beliefs or understanding. Variants of realism include: • Naïve realism (Madill et al., 2000) or Shallow realism (Blaikie, 2007) - reality can be observed directly and accurately • Cautious realism (Blaikie, 2007) - reality can be known approximately or imperfectly rather than accurately • Depth realism (Blaikie, 2007), Critical or Transcendental realism (Bhaskar, 1978; Robson, 2002) - reality consists of different levels - the empirical domain that is made up of what we experience through our senses, the actual domain that exists regardless of whether or not it is observed, and the actual domain that refers to underlying processes and mechanisms • Subtle realism (Blaikie, 2007; Hammersley, 1992)– an external reality exists but is only known through the human mind and socially constructed meanings • Materialism is a variant of realism that recognises only material features, such as economic relations or physical features of the world, as holding reality. Values, beliefs, beliefs, or experiences are 'epiphenomena' –features that arise from, but do not shape, the material world.
IDEALISM No external reality exists independent of our beliefs and understandings. • Subtle or Contextual or Collective idealism (Hughes & Sharrock, 1997; Madill et al., 2000; Shaw, 1999)– the social world is made up of representations constructed and shared by people in particular contexts • Relativism or Radical idealism (Hughes & Sharrock, 1997; Shaw, 1999) – there is no shared social reality, only a series of different (individual) constructions.

Source: Ritchie et al. (2013, p. 5)

3.2.1.1 ***Objectivism***

Objectivism is one of the ontological positions that believe in the reality of events which are referred to as social incidents, which the researcher faces as external factors outside social control. An *objectivism* is a tangible object operating with rules and regulations at the organisational level. Under objectivism, it is believed that activities involve standard procedures; for instance, individual appointments are based on the division of labour and experience. Additionally, the social order is a true representation of an organisation, and the employed personnel is expected to conform to the requirements and standards of an organisation (Saunders et al., 2020). Objectivism is drawn on the perception that "external reality" exists independently of people's opinions or thoughts. Objectivism recognises organisation and culture, looking at how people conduct themselves. Culture and organisation are social entities that interrelate with external actors and have a tangible reality that operates within their system by Saunders et al. (2020).

3.2.1.2 ***Constructivism***

Constructivism requires social actors to represent social events and their values. This implies that social incident exists in the constant version, not necessarily in social interactions. It suggests that reality mainly depends on the people's mindset as meaning is socially created from a happening. Therefore, there must be meaning to an existing independent reality. An individual's perception is essential, as no reality exists in isolation; this could be observation and a generalised view without facts. Objectivism and constructivism are two different variation positions which exist. Therefore, these two positions are best described in Table 3-1 above (Ritchie et al., 2013).

Critical realism is a combination of objectivism and constructivism positions. In addition, the insight is considered a legitimate union of the two extremes. The researcher adopted a critical realist position for the conduct of this study in order to gain in-depth insight into issues around the organisation.

3.2.1.3 ***Critical Realism***

> "*Focuses on explaining what we see and experience, in terms of the underlying structure of reality that shape the observable events*" (M. Saunders et al., 2012).

The study of Saunders et al. (2020) stated that realism refers to what you experience as the truth, including feelings, pictures of things in the actual world, and measurable observations as

"legitimate" forms of reality. Saunders et al. (2020) identify the two primary forms of realism. They recommend that the first set is "direct realism", which means something we experience and is an accurate representation of the world. For example, "*what you see is what you get; what we experience through our senses portrays the world accurately" (*Saunders et al., 2020*)*.

Consequently, this view suggests that the world is relatively unchanging in the context of business, its organisational functions or activities, and the group or individual level. This position has, however, been criticised as being naive (naive realism) (Bryman, 2003; Easton, 2010; Ritchie et al., 2014). The criticism is that it assumes a perfect match between reality and the terms used to illuminate it. Bhaskar (1989, p. 2) argues that direct realists need to recognise that there exist structures and fundamental instruments which produce observable events and hence making views of direct realism artificial.

The second opinion of realism is "critical realism", which presents the acceptance of different positions between the theory of knowledge (epistemology) and the theory of being (ontology). Critical realists believe that observable events are formed or happen through unobservable proceedings, which can be known through investigation or examination of happenings around the society by identifying the cause, its effect and lesson. Critical realism shares cohesions with positivism as it adopted a scientific approach to knowledge development, and the use of the theory in social science differs from the natural science application. While natural science emphasises natural laws for interpreting and understanding data, social science looks at the social structures that have given rise to the event (Bhaskar, 1989).

The researcher accepts critical realism because it will enable the researcher to experience feelings of the world and experience feelings of the theme and the state of mind during intellectual processing (Saunders et al., 2020). Critical realists accept multi-level studies at different stages such as organisational, people and individual levels (Easton, 2010; Saunders et al., 2020). This method will help the researcher to observe social structures (Gorski, 2013). The approach will be adopted as it is best matched to facilitate an in-depth study of the causes of a particular incident or research context, which reinforces supply chain management studies (Easton, 2010; Saunders et al., 2020). The study of the adoption of supply chain collaboration in the oil and gas industry as a means of improving performance is a complex and evolving setting where the researcher will be required to be realistic in reporting events to achieve the study's goals and objectives.

3.2.2 *Epistemological Position*

Epistemology is the philosophical consideration of the understanding and validity of knowledge instead of beliefs (Blaikie, 1993; Matthews & Ross, 2010). Ritchie et al. (2013) in their investigations, suggest that epistemology highlights questions such as *"How can we learn about reality and what forms the basis of our knowledge"* (p. 6). The epistemological position advises a researcher on a worldview and theories about the study (Creswell & Clark, 2007; Guba, 1990, p. 17). The world views are shown in Table 3-2.

Table 3-2: Four Worldviews

Post-positivism	Constructivism
• Determination • Reductionism • Empirical observation and measurement • Theory verification	• Understanding • Multiple participant meanings • Social and historical construction • Theory generation
Transformative	**Pragmatism**
• Political • Power and justice-oriented • Collaborative • Change-oriented	• Consequences of actions • Problem-centred • Pluralistic • Real-world practice-oriented

Source: Creswell (2014, p. 6)

R. K. Yin (2003) criticises the positivism approach for irrational social scientific and multifaceted phenomena. On the other hand, Lincoln and Guba (2000) state that the positivism strategy observed that reality data is only partial. Derrouiche et al. (2010), in their research, suggested that positivism ignores less-visible underlying of enablers. Oppong (2014) conducted a study exploring the positivist method's deepness and indicated that the approach needs more depth of knowledge to build robust theories from complex organisations or situations. Pratt (2009) presents that positivism does not go beyond the observable reality, limiting its opportunities to identify hidden details (Bergene, 2007).

*3.2.2.1 **Interpretivism***

The interpretivism approach seeks to create new, richer understandings and interpretations of the complex context of the social world (Saunders et al., 2020). Interpretivism focuses on the different views of humanity and the physical events that occur for meaning. Interpretivism studies believe that people differ from the natural sciences (Bryman, 2011). The approach is inductively coupled when a researcher obtains data for a study employing empathic neutrality to explore exactly observable and unseen links that shape social reality from many views. Interpretivism started to gain popularity in the 1960s to reject positivism (Bryman & Cramer, 2001). Bryman (2011) argues

that interpretivism considers the critical uniqueness of humans paralleled to natural order Bryman (2011); (Saunders et al., 2020). Wright (1976), in the study of interpretivism, recognises the importance of having insight into human conduct and activities that result in new realities, as supported by Grix (2010). The interpretivism methodology was built on phenomenology, which aims to comprehend how scientists interpret the data collected, environment and symbolic interactionism, which provides a constant interpretation of ideas (Saunders et al., 2020).

Easterby-Smith et al. (2002) conducted a wide-ranging study on interpretivism views. They suggested that "reality is not objective and exterior but is socially construed and given meaning by people". This study aims to identify the enablers and inhibitors of supply chain collaboration, particularly in the oil and gas industry. Several researchers, such as Proctor (1998) argued on the contribution and validity of interpretivism and suggested that it helps researchers build new theories which facilitate research in the social world, as supported by (Hughes & Sharrock, 2016).

On the other hand, the interpretive role provides benefits and ways of handling social behaviours (Alan, 2012; E. G. Guba & Y. S. Lincoln, 1988). It also provides researchers with a level-ground understanding of perceptions and ways of participating in the social setting (Egon G. Guba & Yvonna S. Lincoln, 1988). Corbetta (2003) concisely describes interpretivism as

> *"The very elements that disturbed the scientific research of the positivist approach and were therefore excluded – individual, motivations and intentions, values, free will, in short, the subjective dimension that cannot be perceived by quantitative tools – become the primary objective of research".*

The interpretivism approach favourably supports qualitative data in developing adequate knowledge in a study (Kaplan & Maxwell, 1994).

Looking at the specific context of this study, evolving nature of Nigeria, and the complexity of the industry's supply chain for oil and gas, the researcher accepts the approach of interpretivism for further investigation to identify the enablers and inhibitors of supply chain collaboration in the oil and gas industry leading to performance improvement.

3.2.2.2 ***Postmodernism***

Postmodernism is an approach that focuses on the effective use of language and power relations in any given study. This approach explores questioning the manner of thinking and considering

alternative marginalised views (Saunders et al., 2020). The approach led the movement for poststructuralism. Postmodernism progressed further to challenge the conduct of positivism in an organisation, as it is more objective in nature. The approach believes that effective language use in any study is a priority. They went further to challenge the actions of the objectivist, the reality of a thing (ontology) and in the submission, emphasises the flux of chaotic primacy, change and fluidity (Chia, 2003).

Calas and Smircich (2018) stated, "*postmodernist researchers seek to expose and question the power relations that sustain dominant realities*." Postmodern researchers look at the processes of conducting the studies which have been in existence, and they proceed with research knowing that knowledge shapes the subject of the research (Townley, 1994). This philosophical assumption will not be considered for this study because the researcher is not interested in shaping knowledge in identifying realities.

3.2.2.3 ***Pragmatism***

> *"Asserts that concepts are only relevant in as much as they are relevant for action"(*Kelemen & Rumens, 2008, p. 40*).*

This research philosophy is based on considering the theories, ideas, concepts, testing of the hypothesis and achievement of findings not in an abstract form but the role played by each tool in thoughts and actions. The pragmatist practices are outcome-driven and may include variables such as objectivist or subjectivist. Also, It is suitable for a study with unambiguous issues and can be applied to quantitative and qualitative methods (Saunders et al., 2020). However, this qualitative study aims to identify the enablers and inhibitors of the collaborative supply chain in the oil and gas industry, a complex sector. Therefore, the pragmatism approach is unsuitable. Instead, the complexity of supply chain collaboration of the oil and gas industry can be better understood by applying an interpretivism approach which will help unpack the richness, complexity, and social construct as well as in-depth world view contribution in the sector.

3.2.2.4 ***Axiological Position***

This type of philosophy focuses on the role of value and ethics in carrying out a study (Saunders et al., 2020). It centred the view that every researcher puts effort into bringing value to a study. It has been applied differently by researchers. For example, a quantitative researcher tends to use statistical checks of results to avoid biases, while a qualitative researcher prefers to make those

values identified clearly explained (Creswell, 2014; Jankowicz, 2005), However, It is also significant to acknowledge that a qualitative researcher acknowledges the existence of a particular set of values in society and the biased nature of research rather than neglect them, which could be more unsafe in future (Collis & Hussey, 2013; Denzin & Lincoln, 1989; Johnson & Onwuegbuzie, 2004; Karl Raimund Popper, 1959; Karl R. Popper, 1959; Schrag, 1992).

The researcher of this study believed that individual opinions and values tend to be primary motivators for the action and behaviours they express; hence qualitative researchers express their axiological position as a foundation for the decisions taken in the process of research conduct (Heron, 1996).

The connection between epistemological and axiological perspectives in scientific research is that knowledge produced by a study is studied, analysed, evaluated, and verified or justified by examining broader cultural values. (Carter & Little, 2007). Several studies highlighted that qualitative researchers are more fascinated by behaviours (Collis & Hussey, 2013). Oppong (2014) states that values need to be managed, and qualitative researchers adopt the following rules in any study. The rules include the avoidance of values that affect the authentication of information collected and, what role values play in the study, the acknowledgement of what effect those values have on the entire study process. Again, considering how values should be managed or treated and the promotion of those values should be closely related to the process of the study (Saunders et al., 2020).

3.3 Research Approach

The study employed an inductive research approach, which signifies using a process to explain an event while looking at ideas and facts that support a theory from the conceptual framework (Saunders et al., 2020). In order to understand the background and richness of the collaborative supply chain in the oil and gas industry, the inductive approach will be adopted. An inductive approach is a social science strategy based on two related arguments: the first argument is that it is worthless to explain the social incidence if they are not based on “observation and experience”. Therefore, semi-structured interviews will be employed for the data collection, which will be analysed through the thematic analytical procedure. Glasser and Strauss (1967), which states that theory developed through the systematic empirical study is more likely to fit the data and is therefore likely to be acceptable as well as being useful to practitioners and managers (Gill &

Johnson, 2010; Partington, 2000). Semi-structured interviews are used for the data collection, which will be analysed through the thematic analytical procedure.

3.3.1 *Research Strategy*

The researcher chooses the research strategy to achieve the study goals and objectives given the limitations of time and resources as well as access to potential respondents and other necessary things for the orderly conduct of the study (Saunders et al., 2020). The strategy adopted for this study remains flexible to accommodate the changing nature of social actors (Saunders et al., 2020). The acceptance of the strategy will be based on information-gathering, which will lead to findings. The chosen research strategy for this study is a practical and proportional case study strategy with multiple methods (Saunders et al., 2020; R. Yin, 2003). This study will apply multiple study phases such as interviews, semi-structured interviews, archival research, observation, and document analysis relevant to the investigation. The research onion by Saunders et al. (2020) reviewed seven research strategies, including experiment, survey, case study, action research, ground theory, ethnography and archival research. Nevertheless, for this study, the researcher has adopted a case study research strategy to gain in-depth knowledge of the adaptation supply chain collaboration for performance improvement in the Nigerian oil and gas industry.

Table 3-3: Highlight of Research Procedures

S/No	Research Methods	Approach	Justification
	Philosophies	Interpretivism	Interpretative approach was applied in this study to reveal the true nature and challenges of the adoption of supply chain collaboration in the Nigerian oil and gas industry by interpreting and transcribing the opinions of the respondents into words. It also allows the researcher to analyse the expertise's experiences and the interpretations they gave to the context of this research.
	Approaches	Inductive	The study employed an inductive research approach, which signifies using a process to explore an event while looking on ideas and facts that develop a theory from the conceptual framework
	Strategies	Case study	A case study was chosen in this research in order to gain an in-depth knowledge and facilitates the adoption, enablers, and inhibitors of supply chain collaboration in the Nigerian oil and gas industry.
	Choices	Mono methods (qualitative method)	Qualitative methods are discussed as a broad technique applied for data collection and analysis, involving interviews, observation, action research, and focus groups, and data collection are non-numerical. This study applied mono methods of qualitative method to come up with a rich and in-depth understanding of the research focus.
	Time Zone	Cross-Sectional	A cross-sectional study enables the researcher to collect valuable data, present or report the occurrence of an event in a precise manner and identifies factors that facilitate and inhibit supply chain performance within the timeframe.
	Techniques	Data Analysis	The collected data were subjected to several processes such as transcription, coding and display, data familiarisation, and the

			construction of an initial thematic framework. This follows step-by-step indexing and sorting the data and arrived at themes that answered the research question
		Pilot Study	A pilot study was conducted with some experts in the oil and gas industry and academics to shape, test the robustness of the questions
		Semi-Structure Interviews	These questions were design to enable the researcher to gain more understanding and knowledge on how the supply chain collaboration is implemented in the oil and gas industry in Nigeria and identify the enablers and inhibitors to the supply chain collaboration which leads to performance improvement in the industry
		Purposive Sampling	Purposive sampling is the process of selecting respondents which constitute the representative of a larger population of an organisation for a particular aim and purpose
		Thematic Analysis	Thematic analysis is one of the most common forms of analysis within qualitative research. It emphasizes identifying, analysing, and interpreting patterns of meaning within qualitative data. The research qualitative data collection with thematic analysis to identify, analyse and transcribe themes and partners of the data collected

3.3.2 *Choice of Secondary Data and Archival Research*

A case study of secondary information was carried out in the literature review by the author of this study. The analysis of published information was based on the purposes of this research, and data collected was from newspapers, diaries, letters, University databases, google scholar, websites, and other approved academics database, which was in line with the existing procedures for the effective conduct of archival research (Corbetta, 2003; Kinnear, 1991). Easterby-Smith et al. (2002), state that quantitative and qualitative research with descriptive and expressive research adopt case studies, specifically secondary data. Corbetta (2003) and Ghauri et al. (2005) suggested that the case study strategy is applied in studies to a length of time, financial issues and low alteration but somewhat biased in reporting (Corbetta, 2003). Bell and Bryman (2007) stated that caution should be applied when dealing with secondary data as its interpretation could be difficult sometimes. The difficulties usually associated with secondary data include legitimacy, consistency and categorising events in the proper form and shape. Despite this deficiency of completeness, Patton (2008) and Ghauri et al. (2005) believe that secondary data are contextually rich when validated and can effectively support triangulation from literature, theories in the use and empirical data collected. The author of this study carefully studied case study publications, general reports, newspaper articles, government sources, information and policy documents on supply chain collaboration, supply chain management, supply chain performance and environmental uncertainties. In conclusion, the researcher identified the existing enablers and inhibitors of supply chain collaboration, which are believed to impact an organisation's supply chain performance

positively or negatively. The secondary data comprised significant archival studies and was considered to enhance and provide the researcher with insight into supply chain collaboration as a tool to improve performance. R. Yin (2003) presents that *"for case studies, the most important use of documents is to corroborate and provides evidence from other sources"* (p.87). The insertion of secondary information ensured a robust process to the general case and led to a practical interview-based approach that the researcher will employ.

3.4 Research Choices

A methodology is *"an analysis of the assumptions, principles and procedures in a particular approach to an enquiry" (*Schwandt, 2001*)*. Harding (1987) argues that it is *"a theory and analysis of how research should proceed"* or methods adopted to achieve a study's specific goals and objectives. It is important to note that data analysis should produce knowledge, and appropriate emphasis must be applied throughout the process (Carter & Little, 2007). The epistemology approach shapes the methodology and validates the knowledge made. The epistemological position and the research in question determine the methods used. However, the author has adopted critical realism and its application for this study.

Qualitative methods are discussed as a broad technique applied for data collection and analysis, involving interviews, observation, action research, and focus groups, and data collection are non-numerical. Quantitative methods are usually suitable for extensive data and typically involve questionnaires for data collection and use a scientific approach in analysing the data, such as statistics or graphs that represent numerical data (Saunders et al., 2020). It is important to acknowledge that business and management research methodologies can take the form of a quantitative and qualitative approach as a pluralist methodology (Saunders et al., 2020). "Multiple methods" applies more than one source for data collection. The reason for selecting Nigeria as the location for the conduct of the study and specially selecting oil and gas industry was due to access to information and utilisation of new idea, the oil and gas industry in Nigeria is complex and diverse and the researcher believed in interacting one on one with the company's employee to have in-depth knowledge which could be achieved through qualitative interviews. The new ideas gained will be useful for model development. It involves techniques with matching analytical methods and is valid if the choices are constrained to those accepted for a qualitative or quantitative approach (Tashakkori & Teddlie, 2010). Jeffcutt (2004), presents that management studies involve

both multi-discipline and multi-contextual methods, which means the mixed method is suitable for the conduct of management research. Bell and Bryman (2007), argue that to achieve a robust result, researchers need to employ divergent methods. A mixed method is a combination of quantitative and qualitative methods. It involves many ways of examining an event ranging from simple to complex systems that seek to understand ignored or hidden issues than when applying a single method (Bryman, 2006; Saunders et al., 2020).

It is increasing advocacy Bell and Bryman (2007) stated that management research should involve many processes because there is a likelihood of overcoming weaknesses associated with mono-methods and the need for a vigorous approach. However, this research identifies that qualitative methods are suitable for answering exploratory questions, as stated by Bryman (2006); Saunders et al. (2020). This method is suitable in the examination of the oil and gas industry supply chain which is diverse and complex and the willingness of the researcher to understand the market phenomena.

Qualitative research exhibits a set of divergent but contrasting concerns about what forms acceptable knowledge (Saunders et al., 2020). Van Maanen (1979) presents that the term qualitative has no definite meaning but includes a variety of techniques that describe and translate the observable situation into meaning. Norman and Yvonna (1994), define qualitative methods as empirical evidence that could be texts, words, or images. The author of this study examined the various research methods and agreed on the application of qualitative methods in the conduct of the study based on the need to understand arguments and the practical application of words meaning in a precise and concise manner as it applied to an event (Bell & Bryman, 2007). The method involves understanding the meaning and the events under investigation rather than forecasting and explaining to match the actual situation (Bhattacherjee, 2012; Denzin & Lincoln, 2000). This relate to oil and gas industry as it is more of practical activities that require collaborative efforts or teamwork rather than predicting previous activities. Therefore, this method is used to investigate and understand the designs and implementation of supply chain collaboration in the oil and gas industry of Nigeria. It equally leads to the identification of enables and inhibitors of supply chain collaboration impacting performance improvement of the industry.

Applying the qualitative method makes the author create meaning in the socially constructed world (Bell & Bryman, 2007; Saunders et al., 2020). The application of qualitative method provides the

trust for participants and by making meaning from the information gathered from them through in-depth analysis for their knowledge and ideas (Bhattacherjee, 2012). The application of the qualitative method provides trust for participants by making meaning from the information gathered through in-depth analysis of their knowledge and ideas. Qualitative research connects the idiosyncratic world and provides a detailed understanding and expression of social and practical events. This is normally involving small groupings for a specific purpose and recognises human observation (Bell & Waters, 2018; Bell et al., 2018; Saunders et al., 2020). The qualitative investigation deals with opinions to uncover hidden trends. It also focuses on a particular case or a small number of cases to provide contextualised depth and detailed knowledge of a given study to solve the identified problem.

This study will focus on respondents' views, reflect on them, and their opinions will produce the theme-leading findings, which the research aim, and objectives will guide. The method that will be applied for the entire data collection and analysis will be based on the nature of the research objectives, which is to identify enablers and inhibitors of supply chain collaboration leading to performance improvement. Face-to-face interviews will be conducted, using semi-structured research questions to understand how different are meaningfully involved in the realisation of intended goals of supply chain collaboration in the oil and gas industry in Nigeria. The study questions were drawn from a literature review grounded in the existing information within supply chain management, collaboration, and performance context. This considers the different perspectives of participants and their personal experiences on the supply chain collaboration in Nigeria's oil and gas industry.

Additionally, a qualitative study recognises the structure of social meanings, human behaviour, and perceptions; therefore, this method is suitable for this study because it provides an in-depth of the parties involved. Qualitative methods investigate events by answering "what," "how," and "why" inquiries rather than "how much" or "how many." The researcher will employ these important techniques for structure, question formation, administering semi-structured questions and conducting interviews, transcribing the recorded speech (audio) or behaviour, and data analysis of texts (Bryman et al., 2021; Saunders et al., 2020). The researcher believed that the qualitative research cycle would help provide greater insight into contextual organisational enablers and inhibiting factors, which were part of the research questions. This means the approach

will be as flexible and support the actualisation of the study aim and objectives shown in Figure 3-2.

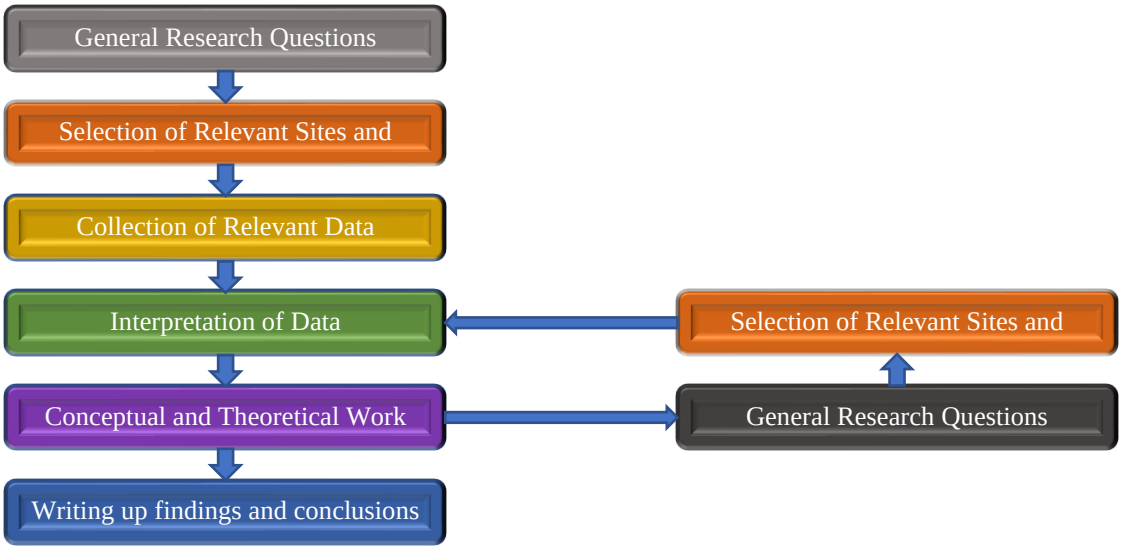

Figure 3-2: The 'Flexible' Qualitative Research Process
Source: Adopted from Bryman (2011, 2016), and Bryman et al. (2021)

3.5 Time Horizon

A time horizon, also known as a planning horizon, has a fixed time that directs and provides processes which are applied to evaluate a context or a time to start and end an investigation (Saunders et al., 2020). Saunders et al. (2020) present that time horizon is important in selecting a research topic or question, considering whether the research should be a "snapshot". This means the researcher is taking consideration of a shorter time as possible. Cross-sectional case studies involving a specific timeframe will be considered for the conduct of the study to understand the happening within a specific timeframe. A cross-sectional study enables the researcher to collect valuable data from the Nigerian oil and gas industry and presents the occurrence of an event in a precise manner. In addition, it identifies factors that facilitate and inhibit effective performance system of the Nigerian oil and gas industry within the timeframe. On the other hand, a longitudinal study is another option involving data collection over a longer period (series of snapshots or notes taken over a longer period of time) which cannot be used for the purpose of this study due to complexity of the oil and gas industry. This is achievable through observation, grounded and action theory, and robust secondary data gathering. Longitudinal studies offer highly contextual investigation and more in-depth scrutiny of key variables but were not accepted as their procedures

are not achievable within the study timeframe and are believed not to be a practical option for this study.

3.6 Data Collection

This is the final aspect of the research onion layer (Saunders et al., 2020). Data for this study will be collected for the aim and objectives of the research by answering the research questions or problems as discussed by Creswell and Clark (2007), This also outlined how a researcher is guided by a process and a systematic approach when conducting an empirical study to comprehend a research topic better and choose a solution (Bhattacherjee, 2012; Silverman, 2011).

The research location is Nigeria because it is a country that represents a typical developing economy that relies heavily on oil and gas for survival, supported by Kale (2020); Kasirim (2021). The researcher also recognised the importance of the oil and gas supply chain programme for the economy. Therefore, the location was chosen because the researcher strongly believes in having access to defendants or oil and gas industry participants to obtain the needed information for the study process. Furthermore, the country suited the purpose of robust and reliable research into adopting supply chain collaboration to improve industry performance. Nigeria may have an accepted application of supply chain collaboration in some sectors, but the oil and gas industry needs a better experience of success in supply chain collaboration.

Furthermore, the researcher conducted data collection in Nigeria's oil and gas industry between March 2021 to June 2021 with a few selected oil and gas companies to identify how supply chain collaboration leads to performance improvement of the industry supply chain system. The data collection outcome allows the author of this study to develop a model for providing an effective supply chain system in the Nigerian oil and gas industry. For further details about the companies used for data collection of this study, see **Appendix C.**

3.6.1 *In-depth and Semi-Structured Interviews*

The researcher chose to conduct interviews as a suitable approach for data collection for this research. The interviews for this study will range from structured (closed) to informal open interviews. A semi-structured interview will be applied for this study to enable flexibility in exploring the context and happenings in the oil and gas industry based on its supply chain collaboration as a tool for performance improvement. The participants were engaged in semi-

structure interviews for the researcher to gain more knowledge on the nature and operations of supply chain collaboration and how its contribution to performance improvement in the oil and gas industry through open communication. Broader themes or patterns were identified from the literature review, which led to the conduct of interviews to gain more insight. Questions will be asked differently depending on the level of interviewees in the organisations. For example, the different questions posed to managers and employees. These questions will enable the researcher to gain more understanding and knowledge on how the supply chain collaboration is implemented in the oil and gas industry in Nigeria and identify the enablers and inhibitors to the supply chain collaboration, which leads to performance improvement of the industry. These questions were drawn based on what was obtainable in the literature reviewed and believed to facilitate an effective supply chain system.

3.6.2 *Interview Guide*

An interview guide (protocol) wase developed for each respondent consisting of all the questions and themes to be explored and served to the selected respondents. The author will apply some flexibility, enabling him to compare the order in which questions will be probed to ensure the interview flow. Some of the interviews will necessitate additional probe questions to pursue up-and-coming themes, which is supported by Eisenhardt (1989), who stated that

> *"If a new data collection opportunity arises or if a new line of thinking emerges during the research, it makes sense to take advantage by altering data collection, is such an alteration is likely to better ground the theory or to provide new theoretical insight."*

In order to achieve a coherent interview, a follow-up will be adopted to probe or further investigate the emerging views to supplement the already standardised questions. In addition, the researcher will encourage respondents during the interview by asking open-ended questions from key-related studies and themes derived from the literature review.

3.6.3 *Pilot Study and Main Study*

The questions were refined, and their validity was tested in pilot research with oil and gas industry professionals and academics. Furthermore, the experts that participated in the pilot study were senior managers from the chosen companies for the interviews and two other university supply chain management experts. It was confirmed capable of delivering the quality and intended

outcome. This was to have the feelings of experts before going into the field for data collection, and Nigeria was chosen based on the access and fewer existing research in the area. It will be used in an academic environment which results in the involvement of academic experts to strike a balance between views.

3.6.4 *The pilot study.*

This section presents the pilot study conducted between experts in the oil and gas industry and academics which confirmed the validity of the questions be to suitable for the conduct of the research aimed at the adoption of supply chain collaboration leading to performance improvement in the oil and gas industry in Nigeria. The question was designed to enable the researcher to have insight on how performance can be improved in the oil sector. The questions are as follows and coupled with the confirmation from experts and academic.

Question 1. How can supply chain collaboration improve performance in the oil and gas industry?

This question was confirmed by a supply chain manager with M-NNPC that: *"in my opinion this question is suitable for the understanding of how collaboration can lead to performance improvement".*

This question was seconded by a senior lecturer in university who equally confirmed that: *"the question is designed with all captions to provide detailed understanding on how supply chain collaboration can lead to performance improvement in the oil and gas industry".*

Question 2. What are the enablers of supply chain collaboration leading to performance improvement in the oil and gas industry?

According to the logistics and supply chains Manager (M-AARano) who satisfied that: "*the design questions 2 is capable of gathering relevant information and data that are related the enablers of supply chain collaboration for the improvement of the Nigerian oil and gas industry performance*".

Also, question 2 was confirmed by the university lecturer on logistics and supply chain management who accepted that *"the question 2 is appropriate because it is an open-ended question that it is capable of making the respondents to think verse towards providing the accurate enablers of supply chain collaboration within the oil and gas industry of Nigeria"*.

Question 3. What are the inhibitors of supply chain performance in the oil and gas industry?

Accord to the M-NNPC who approved that *"the questions 3 is a critical question that it is capable of generating a valuable data for the main study on what are the inhibitor of supply chain collaboration preventing effective performance system in the industry"*.

This was also supported by the senior lecturer at the university who also declared that *"the actual inhibitors of supply chain performance in the oil and gas industry can be achieved through Question 3".*

Question 4: What other strategies you have employed in the implementation of supply chain performance improvement?

M-AARano responded by confirming that *"this question will give room for discussion in identifying what other strategies can be implement in the system and industry if the identified supply chain collaboration design and implementation fails in order to have effective performance system in the industry"*.

As certified by the university lecturer on logistics and supply chain management that: *"the identification of other strategies of supply chain management will serve as a recovery process for the industry if the initial supply chain collaboration fails in order to keep the supply chain system effective and this can also be achieved through question 4"*.

3.6.5 *The* summary *of a pilot study*

Question 1. How can supply chain collaboration improve performance in the oil and gas industry?

The design of supply chain collaboration by the Federal Government of Nigeria within its mainstream oil and gas company (NNPC) aims to caution against the burden experienced and allow the adequate flow of the product across the country to meet customers' demands. Collaborating with suppliers improves product lead time, order fulfilment, access to continuous supplies and efficient resource use. Our organisation's collaboration with customers enables continuous improvement in our service delivery method, meets market changes, and timely responds to new trends in the market.

Supply chain collaboration is crucial for performance improvement in the oil and gas industry because it brings about teamwork and transparency in the sector's operations and activities. Time

is crucial for any practical implementation at procurement and distribution levels. The key pillar for successful operation in the oil and gas industry focuses on time and quality product delivery which can be achieved when there is synergy among organisations.

Question 2. What are the enablers of supply chain collaboration leading to performance improvement in the oil and gas industry?

The supply chain collaboration occupies a substantial position in the oil and gas companies' toolkit policy, enabling organisations to achieve their goals and objectives. The noticeable enablers include integrated transactions, effective information sharing and joint planning for a successful operation. In addition, the efficient and successful implementation could lead to several benefits such as time and quicker decision-making, lower out-of-stock levels as lead times are shortened, warehousing and transportation cost reduced, and accountability into demand and supplier performance.

Question 3. What are the inhibitors of supply chain performance in the oil and gas industry?

The key inhibitors of supply chain collaboration in the oil and gas industry in Nigeria can be categorised into three fords: infrastructure resulting in late and delayed delivery, communication affecting information sharing, trust and relationship, and security challenges leading to attacks on trucks, theft or vandalisation on the distribution channels resulting from breaching of agreement of not meeting customer's order. Finally, the industry policy can be significantly affected by the change in government regime as any administration change affects the sector's operation in terms of regulations and commitment. The oil and gas industry is the central pillar of Nigerian economics, and most of its policies must be formulated by the central government without involving other relevant stakeholders, especially the private sector.

From the academic viewpoint, it was established that supply chain collaboration is a vital element to organisation performance but has yet to be effectively adopted and implemented into the systems to produce the desired result (S. E. Fawcett et al., 2008; Singh et al., 2018). This area needs to be explored more, particularly in developing nations with challenges of physical infrastructure and communication channels.

Question 4: What other strategies you have employed in the implementation of supply chain performance improvement?

The key essence of question 4 was to explore whether there are other strategies to be employed in determining ways to improve performance in the oil and gas industry order than supply chain collaboration. Experts in the industry and academics advised keeping this question as an alternative question to gain more ideas from the respondents. This was confirmed to be a good question for the research.

Based on the pilot study's response, the researcher was convinced that the questions were suitable to produce the necessary outcome and could provide the needed answers. Furthermore, the researcher proceeded to the field for face-to-face data collection, observing the reality of things.

Face-to-face interviews were employed, which helped the researcher observe the respondents' non-verbal behaviours and determine whether questions were sufficiently answered, consistent with recommended guides by Saunders et al. (2020). Before conducting the fieldwork, a letter seeking approval was sent to the concerned parties, and approvals were granted. This was in accordance with the rules governing data collection in Nigeria.

3.6.6 *Sample Techniques*

Purposive sampling is the process of selecting respondents who represent a larger population of an organisation for a particular aim and purpose (Gall et al., 2007; Tongco, 2007). A body of people is referred to as a population where a sample was taken for the purpose of the research (Collis & Hussey, 2013). The author of this study constructed a sampling size that their ideas will be used as representative of the general population for this research.

The researcher has carefully selected 50 respondents who will be interviewed. The respondents are drawn from different states of Nigeria for adequate representation. The sample is made up of managers and employees.

The essence of sampling across the country's different states was to ensure true coverage and to have a spread of evidence from all the various respondents across Nigeria. As part of the validity of data for this research, effective sampling helps with the external and internal validity of the research data. It is worth acknowledging that it is possible to assess the intended number of interviewees for the interview.

It is essential to acknowledge that most organisational studies use samples of individuals who are willingly available, knowledgeable and ready to participate in the practice (Brislin et al., 1973).

Interviewing the entire managers and employee's population will be impossible for this study. Therefore, respondents will be reduced to a manageable figure through sampling techniques (Teddlie & Yu, 2007; Vogt, 1993). This will be one of the criteria to reduce the biased outcome of the study, as supported by Welman et al. (2005).

A purposive sampling is accepted and will be employed for this study because the selection decision will be structured in a manner that includes the concerned persons who are knowledgeable and have an insight into the oil and gas industry activities in Nigeria. This approach will enable the researcher to have an in-depth exploratory investigation of the issues faced by the oil and gas industry. Accessing some of the selected respondents may be challenging due to the distance travelling from one state to another, the rural settlement pattern of customers and time constraints. Still, the researcher will make every effort to reach all selected respondents. At the initial stage the researcher insisted on interviewing 50 respondents, seeing a breakdown in Table 3-4. Finally, the research ended up interviewed 30 respondents at the point the responses from the interviews started repeating its self which indicates to the researcher that the whole interview processes has reached the saturation point and no further novelty can be achieved in the process Table 3-5.

Table 3-4: The Planned Sample of Interviewees.

Distribution of Interviewees	**NNPC MEGA**	**TOTAL NIGERIA**	**RAIN OIL**	**AA RANO**	**OANDO PLC**	**MOBIL**	**CAPITAL OIL**	**Total**
Managers	3	2	2	2	2	2	2	**15**
Employees	5	5	5	5	5	5	5	**35**
Total of interviewees	8	7	7	7	7	7	7	**50**

Table 3-5: The Sample of interviewees Interviewed.

Distribution of Interviewees	**NNPC MEGA**	**TOTAL NIGERIA**	**RAIN OIL**	**AA RANO**	**Total**
Managers	3	3	2	2	**10**
Employees	5	5	5	5	**20**
Total of interviewees	8	8	7	7	**30**

As mentioned in section 1.2 the researcher of this study has a good understanding of the issues facing the oil and gas industry, which is a subject under examination and is aware of the key actors

in the research. Therefore, the selection of participants is based on their knowledge of the oil and gas supply chain across the states.

Before the interview, it is expected that the researcher will take some time to explain the collection process and data handling and answer questions from the respondents. Respondents will be expected to willingly sign the consent form keeping one for themselves and a duplicate for the researcher. The researcher will verbally conduct the interview, and the communications will be recorded via written and audio recording at the convenience of the respondents. The interviews will take place in their offices or any secure, convenient location. They will last for approximately 1 hour per participant based on the openness and availability of the respondent. Suppose the process is interrupted by an emergency of meetings or sensitive calls. In that case, the researcher will ensure that the interview continues later, which means that it sometimes lasts more than 1 hour. Time will be of the essence for the researcher; therefore, all interviews will be focused, and the researcher will engage the respondents meaningfully in order not to compromise with the interview quality. It is important to note that interview duration is not a limiting factor and has no adverse effect on the quality of the information that will be provided to the intended questions. All will be sufficiently covered as supported by (Roscoe, 1975). The researcher will always thank the respondent for their acceptance to participate in the interview. The researcher will request the respondents' contact information at the conclusion of the interview in case further follow-up is necessary, which will be beneficial. The transcription of the data collected must be done within 72 hours to ensure consistency and effective interpretation of information in its original form.

3.7 Data Analysis

The collected data will be subjected to several processes, such as transcription, coding and display, data familiarisation, and constructing an initial thematic framework. This follows step-by-step indexing, sorting the data, and arriving at themes that answered the research question. Finally, the researcher will employ a formal analysis process to analyse the collected data, as shown in Figure 3-3. Transcription represents words and non-linguistic behaviours of an individual conversation in a graphic or words form (Kowal & O'connell, 2004). Transcription is a process of transferring the recorded interview information by manually typing word-for-word as it was presented and from reading evidence about an event (Lapadat & Lindsay, 1999; MacLean et al., 2004). Miles and Huberman (1994), stated that the research protocol support analysis of manually transcribed data

through coding for data display and data regression to a more precise and controllable size for effective handling. The three protocols will be applied to achieve results for this study. The procedures include data categorising, description, and explanation or verification to draw conclusions.

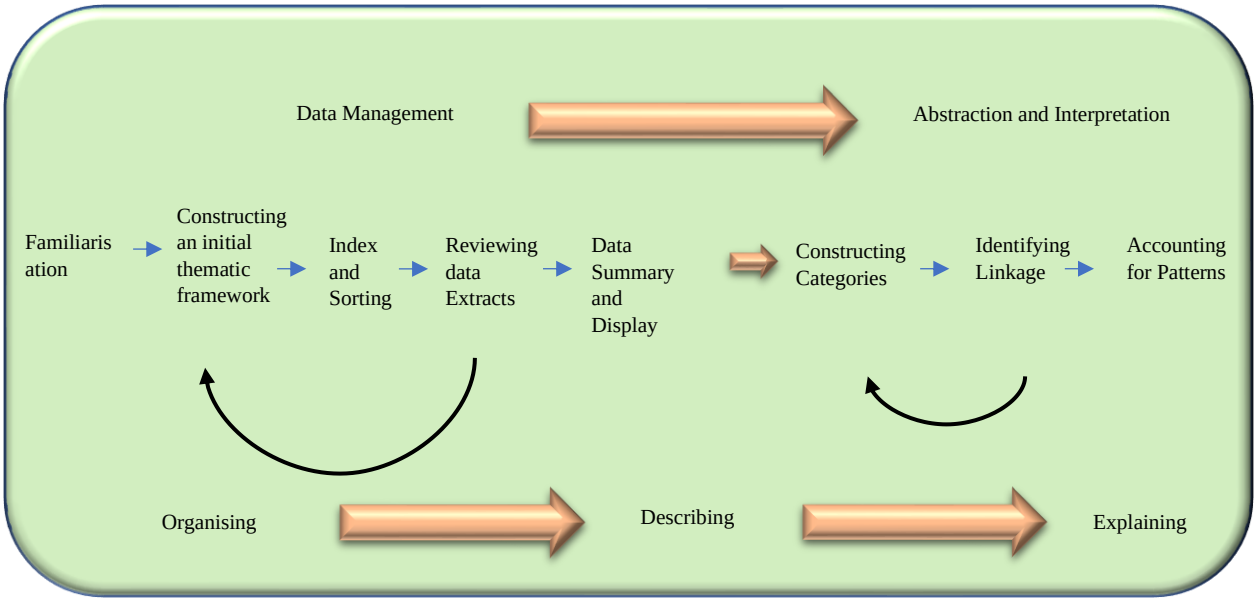

Figure 3-3: The formal analysis process
Source: Adopted from Ritchie et al. (2013)

The researcher will develop means to familiarise himself with the data by observing the systematic process and constructing an initial thematic framework, including indexing and sorting the collected data. The data will be extracted, summarised, and displayed following a coherent process. Therefore, the researcher will construct categories or themes, identify the linkages, and finish with outcomes that answer the main study questions looking at enablers and inhibitors of supply chain collaboration. A thematic analytical approach will be employed to support the researcher in arriving at the findings for this study.

Data coding is the process of shielding data and individual opinions to establish trends` (Auerbach & Silverstein, 2003). The researcher will use an open manual coding system; this implies that the researcher will read through the transcripts, identifying categories, and coding them. All assigned codes and statements relevant to the study will be arranged appropriately in accordance with themes coming from the data collected, and similar themes will be clustered together. This will

enable the researcher to gain better insight into the event and distinguish patterns and irregularities of activities.

3.8 Research Validity

This is a specific procedure employed by researchers to check data collected for validity and consistency to be used in the research. G. Gibbs (2007a, 2007b); G. R. Gibbs (2007a, 2007b) explain that reliability is a consistent approach used by researchers across situations and participants. It relates to how strategically a technique measures ideas so that other researchers will receive the same results when repeated (Perry, 2001; Yin, 1994). *Validity* is a process that researchers employ to determine the originality or exact nature of findings obtained from the research, considering the researcher's position, the respondents, and the reader's views (Creswell & Creswell, 2017; Creswell & Miller, 2000).

Reliability, validity, and generalisation are traditional perceptions used by qualitative research to determine an outcome of a study to establish confidence in the method used and to ensure rigour and richer data content in the context of the study (Creswell, 2014; Ritchie et al., 2013). However, some authors in recent years believe that qualitative research may have different philosophical positions and that the purpose differs. As a result, some prefer to use alternative frameworks for robust investigation (Creswell, 2014; Ritchie et al., 2013). These include avoiding the necessity for a test of validity and reliability method and dealing with credibility, dependability, trustworthiness, plausibility, transferability, and authenticity. After extensive and careful study, the researcher decided to embark on the validity and reliability approach, which will be applied to this study. Further detail can be found in Table 3-6.

Table 3-6: Types of Validity

Construct Type	**Actions to be Taken by the Researcher**
Construct Validity	Construct validity is relating to the process used to measure a situation successfully, which will capture the concepts meant to capture (Seale, 2012). The researchers will carefully listen to the interviews recorded many times and transcribed the interviews into manuscripts. The manuscripts will be read and analysed using thematic techniques (Attride-Stirling, 2001; Berg et al., 2004; Ritchie et al., 2013). This will be done to ensure the themes identify and keep with the main study objectives and identified the themes from the literature review.
Internal Validity	This is the extent to which a connecting statement enhanced the research. The researcher will combine opinions experts (managers and employees) on supply chain collaboration leading to performance improvement. Consequently, interpretations drawn from the data of the study will be identified, examined, and contrasted with the use of multiple tools and informants to ensure robustness to the patterns mined for the purpose of the study.
External Validity	External validity involves the extent to which the study findings can be generalised to a population and other settings. The research scope and design will be done in such a way that enables the generalisation of findings (Ritchie et al., 2013). It is important that participants for this study will be drawn from different states of

	Nigeria. This sampling will effectively enable the researcher to generalise the findings of the study. The researcher will then declare the methodology employed to examine the issues of supply chain collaboration in the oil and gas industry and to allow repetition or to be applied in different states of the country.

3.9 Reflexivity and the researcher

A study can be influenced by a researcher resulting in a bias of the research process, and therefore courtesy must be applied during reflexivity, which the researcher will critically reflect upon (E. G. Guba & Y. S. Lincoln, 1988; Ritchie et al., 2013; Shacklock & Smyth, 1998). This procedure will help prepare the researcher to apply caution not to influence the interviewees during data collection and after for effective presentation of precise information as supported by (Denzin & Lincoln, 2000, p. 183; Pillow, 2003, p. 173; Ritchie et al., 2013; Rose et al., 2014). The reflectivity process can be observed at multiple levels (Haynes, 2012; Johnson & Duberley, 2003; Lynch, 2000), as shown in Table 3-7.

Table 3-7: Types of Reflexivity

Types of Reflexivity	Description of the process
Philosophical Reflexivity	How present the researcher's commitments philosophically (ontological, epistemological, and axiological) influence how the research accepted the approach for the study? How the accepted approach influenced by the study project in turn?
Theoretical Reflexivity	How is the forming of the research problem and the accepted method is shaped by existing theories? How applied theories impacted by the study process?
Methodological Reflexivity	How are the researcher views and preferences regarding the accepted approach for the study shaped by the research process, and how do they shape the research process?
Standpoint Reflexivity	How does the researcher cultural, political, social, and emotional viewpoints shape the researcher method to the study?

Source:Haynes (2012); Johnson and Duberley (2003); Lynch (2000)

Reflexivity is crucial when a researcher has a devolved interest in the study, such as conducting a study in an organisation or country context that the researcher knows about. For example, the case of this thesis focuses on adopting supply chain collaboration as a tool for performance improvement. The direction of Rose et al. (2014) will be duly acknowledged, and the researcher has and will apply multiple levels of reflexivity at the design, fieldwork and analytical phases for the conduct of the research in order to ensure an unbiased method was undertaken (Denzin & Lincoln, 2000; Reinharz, 1997). This entire research will be supported by applying qualitative methods with multiple interviewees. The researcher will therefore accept to be an "Empathic Neutrality" researcher (Ritchie et al., 2013). This implies that the researcher's values are recognised in this thesis, and these are obvious steps and efforts to avoid deliberate or insensible biases.

3.10 Research Ethics

The definition of "Research Ethics" is a commonly used term in institutional and regulatory policy within an organisation that guides the behaviour or conducts of an individual to conform to the set terms and conditions (Pimple, 2002).

The researcher will apply for ethical approval and data protection approval from the University of Strathclyde. This is to establish the suitability of the field interview guide and overall methodological approach. Ethical issues are crucial for conducting any research, as supported by Busher and James (2002). In their study, Cohen et al. (2013) identify why some researchers cannot achieve all ethical problems. They went further to state the two qualities researchers need: "*the sensitivity to identify an ethical issue and the responsibility to feel committed to acting appropriately in regard to such issues",* as supported by Eisner and Peshkin (1990). The researcher will be careful in handling the data collected, and the confidentiality of gathered information will be a critical consideration. Observing all ethical issues will lead to the use of codes, which vary from society to society, person to person, and from one organisation to another (Busher & James, 2002). Cohen et al. (2013) suggested that ethical decisions are needed for *"a balance between demands placed on them as professional scientists in the pursuit of truth, and their subjects' rights and values potentially threatened by the research" (*Cohen et al., 2013*).*

The context and access to respondents involve ethical considerations, which are significant concerns of the qualitative researcher (Creswell & Clark, 2007; Frankfort-Nachmias & Nachmias, 1996). Eisner and Peshkin (1991, p. 215) researched and stated that:

> *"We all like the idea of informed consent, but we are less sure just who is to provide that consent, just how much consent is needed, and how we inform others so as to obtain consent when we have such a hard time predicting what we need to get consent about*."

The researcher will try as much to assure respondents of their rights throughout the process of conducting the interview, and they are free to quit participation if they feel insecure because their contribution was voluntary. Respondents will be made to know about confidentiality, which the researcher considers primary by coding all participants with special codes for the purpose of this study. Anonymity will be one of the advantages of maximising reliability and inconspicuously enhancing responses concerning sensitive themes (Babbie, 2007; Saunders et al., 2020; Singer et al., 1999).

The researcher will comply with the research protocol and the University of Strathclyde Research Ethical requirements. Furthermore, the researcher will ensure the confidentiality of the information of the interviewees so that their responses cannot be identified. All data obtained from the field will be used solely to further the aims and objectives of this study and other publications in academic journals.

3.11 Chapter Summary

This chapter has presented the philosophical statements of valid knowledge and theory building from a critical realist viewpoint for selecting data collection techniques. The researcher adopted a pluralist approach and cross-comparative study strategy to support this research effectively. For quality assurance, the data collected will be validated using verifying sources and employing multiple interviewees, details in chapter 5 and appendix E and F. Huberman and Miles (1994) support the cross-case approach as the best strategy. This enables coding and identification of the themes used, leading to data display. The identification of the main themes will be manually coded and formed into study findings, then transformed into the model presented later in this thesis.

In conclusion, this study adopted an interpretative strategy to analyse the development of oil and gas sector supply chain collaboration as a social construction based on existing literature (Saunders et al., 2020; Van Manen, 1990). This implies that the benefit of interacting with oil and gas experts is learning from their experiences and developing meaning from the major factors that enable or inhibit effective supply chain collaboration in the industry. This means that the approach or process will help create knowledge, as supported by (Flowers et al., 2009; Geertz, 1973). This acceptance of this approach was in line with the decision of Blaikie (1993) who state that

> *"…knowledge is seen to be derived from everyday concepts and meanings – the social researcher enters the social world in order to grasp the socially constructed meanings and then reconstructs them in social scientific language. At one level, these latter accounts are regarded as redescriptions of everyday accounts; at another level, they are developed into theories."*

This study was guided by supply chain theories such as resource dependence theory, transaction cost economics, systems theory, and network theories. these theories will develop strategies to support the components of findings that constitute the model development. Most notably, systems

theory will help develop supply chains in the oil and gas business. Further datils on supply chain theory that supports the research can be found in chapter 8.

The next chapter presents the data collection chapter, where the researcher accessed interviewees and collected data.

Chapter 4 : Data Collection, Analysis and Findings

4.1 Introduction

Chapter five presents how the research data was collected and its adopted approach for analysis and presentation of the findings.

This section of the thesis presents the views on the adaption of supply chain collaboration in Nigeria's oil and gas industry. This chapter presents the findings from the interviewees' views, which were answers to the research interview questions. The researcher analysed the data collected using a thematic approach following the step-by-step process to arrive at the findings. Interviewees were selected from four key oil and gas companies in Nigeria with a significant market share of approximately 75%, which encompasses Nigerian National Petroleum Corporation (NNPC), Total Nigeria, Rain Oil and A A Rano.

The chapter seeks to provide knowledge and insight on the effective implementation of supply chain collaboration in Nigeria's oil and gas industry to enable efficient and effective resource movement among stakeholders and a sustainable supply chain in the industry and nation.

4.2 The Key Participants of the Study

This section of the chapter presents the main participants from which data were collected. They were instrumental in identifying the enablers, inhibitors, and strategies for performance improvement in Nigeria's oil and gas industry. A total of 30 respondents were interviewed, involving the managers and other employees involved in the company's operations and supply chain management and are experts in their respective areas or units and as well involved in the decision-making company's decision-making.

The Managers

According to Shastri et al. (2021) a manager ensures effective management of organisation functions by fostering collaboration and connection with others. It is important to note that managers are responsible for directing and controlling organisational resources for positive performance (Bartlett & Ghoshal, 1992). The managers are senior staff working in the oil and gas companies, overseeing several units and departments, and they are involved in policy-making for the smooth operations of the companies. They ensure efficient and effective planning, control, and allocation of resources to achieve the company's desired success. Managers are responsible for

enabling working conditions by designing and implementing people-oriented programmes, coordinating the effort to make a positive impact, and promoting teamwork to boost productivity. Managers collaborate to ensure synergy in information and adequate product flow in Nigeria's oil and gas supply chains. They can provide solutions to challenges facing the sector and its performance. For this research, the managers are the top management team of the selected companies. They are heads of different departments or units that constitute the company's supply chain, such as the procurement department, logistics and transportation department, information and communication unit, finance department, and projects management unit.

Additionally, the managers are believed to be experts in logistics and supply chain management. Therefore, they must have a certain level of experience to be qualified to head any department. As such, the researcher was convinced to source data from them regarding supply chain collaboration for performance improvement.

Employees

This study refers to employees as supervisors or team leaders who are subordinate to managers but are part of companies' decision-making and have vast experience in expertise. They are responsible for the day-to-day functional operation of the company and building bridges (relationship creation) for the effective connectivity of companies. Employees have an overview of a group of people in the company, motivate them, give instruction as required and monitor performance. They are actively involved in delegating duties or activities to team members, and they are in charge of ensuring the team members have clear objectives, and front-line person, and promote harmony among members. Based on the selected supervisor's and team leaders' roles, it was important to interview them to gain more diverse opinions rather than interviewing only the top management team. The researcher's decision to involve top management and other staff gives him a deeper grasp of supply chain collaboration in Nigeria's oil and gas business.

A purposive sampling of experts around operations and supply chain in the oil and gas company was necessary to remain dedicated and comply with all procedures to achieve reasonable and valid analysis, which led to logical findings from the data collected. This approach granted the researcher the support to comprehensively examine all the aspects that enable and inhibit supply chain collaboration and its performance in Nigeria's oil and gas industry. The detailed breakdown of a total of 30 Managers and Employees from the four selected companies is shown in Table 3-5.

4.3 Interviews

The location and interviews for the data collection were conducted in Nigeria, involving four major oil and gas companies: **NNPC, Total Nigeria, Rain Oil and AA Rano**. The participants interviewed include some selected managers and employees who were directly involved in the operations of the oil and gas industries and their supply chain management. The interview exercise was successfully carried out by the researcher, respondents voluntarily participated by providing their opinions and views on the questions asked by the researcher. However, the researcher reached saturation when the interviewees' responses were constantly repeated, and there were no new or different ideas from the respondents. Therefore, the researcher decided to stop the interviewing process and concentrate on putting the views together—the stage where the questions asked guided the respondents' ideas. More detail of the flow chart is included in Appendix C.

4.4 Data Transcribe and Interpretations

The researcher collected data from respondents from the four selected oil and gas companies in Nigeria through recording; notes were taken (see appendix D). This stage of data management enables the researcher to listen to the recordings to have in-depth insight and understanding of the respondents' views and was able to transcribe the voice recorded into notes manually. The researcher interpreted the views of interviewees and ensured that the transcribed data were exactly the representation of respondents' opinions without any additional or contrasting views. The word-for-word procedure was to ensure that interviewees' actions through spoken words were captured in a text form to be used in the analysis and display, which will be shown later in the chapter. The researcher made educated decisions by triangulating responses with literature and theories.

4.5 Construction of Themes and Indexing and Sorting

The data collection was through interviews with managers and employees to collect qualitative data in the form of answers to particular questions pertaining to the topic that is the focus of the investigation. Transcription was the process of transforming audio recordings of interviews into written text by turning the spoken words into text. After completing this step, the researcher proceeds with further analysis knowing that the data are in a format that is easy to work with. Familiarisation of the date collected was conduct where the researcher read and go through the transcribed data numerous times, becoming familiar with the content and gaining a full knowledge of the collective opinions expressed by the respondents in the process. The researcher was able to

better grasp the primary ideas, concepts, and viewpoints that emerge from the data as a result of this repeated reading. An examination of the content, When the researcher was acquainted with the data, one of the first things was to look for initial themes or patterns that are present in the information from a more general standpoint. The respondents may have voiced repeating concepts, similar points of view, or similar experiences, all of which have serve as the basis for these themes. The objective was to acquire a general comprehension of the contents of the data as well as a picture of the data.

The researcher proceeded with more investigation and examination of the data to zero down on the most important recurring themes or patterns. This process is known as "theme reduction." This step entails refining and narrowing down the identified themes to the ones that are the most prominent and significant in capturing the essence of the views and opinions expressed by the participants.

After becoming acquainted with concepts, the researcher develops themes by identifying similar concepts, grouping them, and noting differences between each query. The construction of patterns in a thematic analysis enables the researcher to organise ideas flexibly and to effectively classify large amounts of collected data into compositions (Braun & Clarke, 2021a, 2021b; Braun et al., 2021). To achieve the aims and objectives of this study, the researcher classified each company's managers and employees according to their respective concepts and contributions. All respondents drew similar conclusions regarding four key areas, supported by a number of sub-questions pertaining to the adoption of supply chain collaboration, enablers, inhibitors, and performance enhancement in Nigeria's oil and gas industry.

Using a thematic approach, the researcher grouped the collected data to ensure that interviewee responses addressed the research questions and topic. This phase of data management allows the researcher to transmit the interview transcripts to the study's interviewees. Some managers were provided the opportunity to examine what they had said, and they agreed that the transcripts accurately represented their ideas. The researcher proceeded with follow-up questions after the initial interview of some respondents, where some responses needed to be clearly established. This was accomplished via phone calls and emails to ensure that the opinions of the respondents were plainly stated and added to the main data.

4.6 Data Summary and Display

The researcher started the data collection from a pilot study involving two academic experts from the university and two managers from the four selected oil and gas companies to sharpen and establish the nature and capability of the questions providing the intended answers for the research. It was established that the questions cover all aspects that constitute the aims and objectives of the research, see section 4.7.4 for pilot study results. Interviews were used to gather valuable data for this study, participants' responses were recorded, and notes taken were necessary. The researcher transcribed the data and followed all the due processes of data familiarisation, construction of themes, indexing and sorting, reviewing the data and displaying data summary Figure 3-3. The researcher ensures that the data displayed covers each of the main and sub-questions in full and well summarised, making it easier to identify the key themes and categories for the study.

The data was guided by four central questions which reflect the aims and objectives of the study as follows:

Question 1. How can supply chain collaboration improve performance in the oil and gas industry?

Question 2. What are the enablers of supply chain collaboration leading performance improvement in the oil and gas industry?

Question 3. What are the inhibitors of supply chain performance in the oil and gas industry?

Question 4 What are the key strategies utilised to enhance supply chain performance?

In accordance with the thematic approach, the interviews are summarised according to the themes which became obvious during the interviews.

The findings are centred on the four questions used to address the research topic. All the interviewees were asked the same questions. The questions are presented above and labelled as **Q1, Q2, Q3 and Q4** in the remaining sections of this thesis.

Data collected from the industry were analysed using thematic analysis to arrive at the findings. The analysis included constructing patterns indexing and coding to sort the data, summarising the data and display, constructing categories, identifying linkages, and ending up with themes. In the following sections, opinions reported are denoted in italics and inverted commas and represent the interviewee's direct experience and understanding of supply chain collaboration and its impacts in the oil and gas industry—the tables below present data displayed in summary based on the interviewee's response to each question.

The codes **M-NNPC, M-TOTAL, M-RAIN, M-RANO** represent managers from their respective companies, **E-NNPC, E-TOTAL, E-RAIN, E-RANO** means employees from each of the selected companies in the oil and gas industry.

4.7 The Display

This section presents the display of summarised views of managers and employees as it was captured and identified. Some identified components overlap or are related but play a significant role in the organisation. The significance of the data display lies in the fact that it aids in recognising the study's findings, which are tabulated below.

Table 4-1: Data Display on Question 1 (The Managers and Employees View)

Respondents	Question 1: How can supply chain collaboration improve performance in the oil and gas industry?
M-NNPC **M-TOTAL** **M-RAIN** **M-RANO**	Majority of the managers interviewed confirmed the adoption of supply chain collaboration in their various organisations, and one stated that effective goal alignment is achieved through collaboration. Most managers interviewed said supply chain collaboration is essential to company sustainability in Nigeria's oil and gas industry, as it fosters developing confidence, suppliers' and buyers' connectivity, and customer satisfaction. Majority of the managers commented that effective operation and resource flow is vital when collaborating with partners. Most managers suggested that customer satisfaction is prime for business collaboration. Majority of the managers stated that collaboration could be achieved through trust and effective communication. One went further to suggest that collaboration is helpful in risk reduction, cost serving and good planning. Most manager said that for any meaningful collaboration, a good relationship is necessary. Majority of the managers suggested the essential role of teamwork in the success of an organisation, which is part of effective collaboration. Most managers commented that collaboration adopted by their organisation has helped in effective information sharing and improved the industry's overall performance. Most Manager mentioned trust with emphasis specifically as a tool for improving and permitting information sharing. Majority of the managers mentioned cost reduction as a collaborative strategy for profit maximisation. Good leadership is needed to develop supply chain collaboration, which improves performance, according to most managers. Majority of the managers pointed out that performance management is essential in controlling activities at both internal and external levels. Most manager pointed out that effective management of input and output is prime to supply chain collaboration which helps performance improvement. He further suggested that collaboration should be managed through trust and commitment. Majority managers pointed out that adopting collaboration in their supply chain operation has helped their organisation to be flexible, keeping to time. Majority of the managers stated that collaboration enables informed decision-making in an organisation.
E-NNPC **E-TOTAL** **E-RAIN** **E-RANO**	Majority of the employees interviewed confirmed the adoption of supply chain collaboration in their various organisations or companies, and they were happy to present some of the enabling and inhibiting factors.

	Most interviewed employees mentioned that the connectivity of suppliers is one of the components for adopting collaborative supply chain collaboration in Nigeria's oil and gas industry. Majority of the employees interviewed believe that effective operations and resource flow are key in maintaining and adopting supply chain collaboration in their various organisations. More interviewed employees stated that customer satisfaction is one of the aspects that contributed to adopting the collaborative supply chain in Nigeria's oil and gas industry. Majority of the employees interviewed in the first instance stated that trust is needed in any collaborative effort of an organisation to achieve the desired outcome. Majority of the employees believes that a good relationship is required for an effective operation that will help in performance improvement. Most employees interviewed presented their views that teamwork is the driver of supply chain collaboration. Majority employees interviewed commented that information sharing plays an important role in adopting supply chain collaboration in oil and gas companies. Majority of the employees stated that trust is an integral part that forms organisation collaboration at all levels or as a bridge that connects all the stakeholders. Most interviewed employees believe good leadership is the foundation for achieving supply chain management and collaboration in the organisation. Majority of the employees interviewed showcases his view that performance management is very important for sustainable collaboration in their organisation. Most employees commented that input and output management is an important element in achieving effective collaboration in an organisation. Majority of the interviewed employees stated that effective collaboration could be realised by having flexibility and timeliness in operations, which is key for binding organisations together. Most interviewed employees suggested that decision-making becomes easier when organisations collaborate.

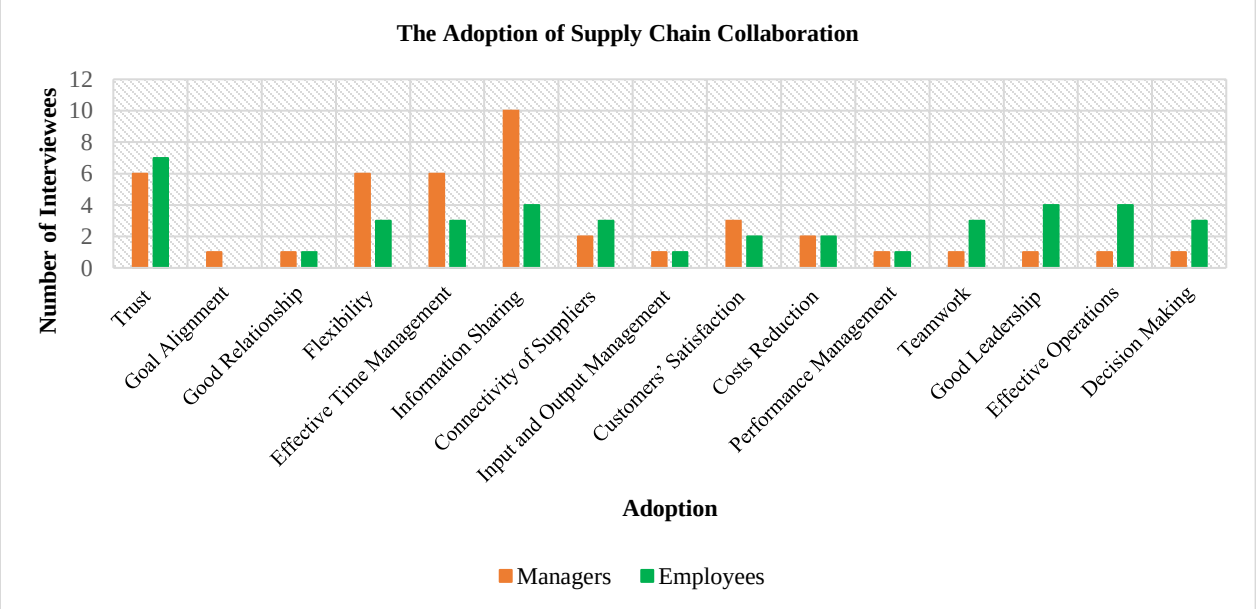

Figure 4-1: The Elements for the Adoptions of Supply Chain Collaboration in the Oil and Gas Industry

As seen in Figure 4-1 and Table 4-1; the interviewed employees ranked teamwork, good leadership, efficient operations, connectivity of supplier, trust and decision-making as the most

essential factors for adopting supply chain collaboration in the oil and gas industry. On the other hand, the interviewed employee's manager trust, flexibility, effective time management, information sharing, and customer satisfaction as the most critical factors.

Table 4-2: Data Display on Question 2 (The Managers and Employees View)

Respondents	**Question 2: What are the enablers of supply chain collaboration leading performance improvement in oil and gas industry?**
M-NNPC **M-TOTAL** **M-RAIN** **M-RANO**	Majority of managers commented that good leadership is essential for effective supply chain collaboration in Nigeria's oil and gas sector. Their different comments suggested that an organisation cannot be a success without having good leadership in place. Most managers interviewed in their opinions stated that trust is one of the key elements that keep their collaboration moving; in their submissions, they clearly stated the importance of trust for the success of collaboration in their organisation. Majority of managers acknowledged the significance of effective relationships in the conduct of their business collaboration with both customers and suppliers. Most managers mentioned target and goal alignment as sensitive components that enable business collaboration for performance improvement. Majority of managers commented that effective resource flow in the system is an essential thing that is needed in collaboration for effective business operation. It is one of the essential tools helping the organisation realise its desired success. Most managers interviewed commented that timeliness is the key component required in any meaningful collaboration in an organisation to succeed. Time is needed for planning, delivery, and distribution. Majority managers interviewed stated that effective planning provides enabling support to achieve success in the collaborative operation of their companies. Most managers interviewed believe that quality management is an important enabler in achieving supply chain collaboration in the oil and gas organisation. Majority of managers interviewed stated that continuous improvement is one of the components needed as enablers to facilitate effective collaboration. Most managers interviewed commented that effective communication is an enabler because, in collaboration, an organisation needs to communicate their policies in clear terms. Most interviewed managers suggested that channels of communication are needed for effective collaboration to enable effective communication into the system. More managers interviewed mentioned that information technology is the key element enabling the organisation's collaboration. Majority of managers interviewed said information sharing is an integral component that enables organisations to collaborate effectively and improve performance. Most managers interviewed believe that road network plays a vital role in enabling collaborative supply chain management. Most managers interviewed in their submissions presented that financial flow is crucial for enabling a firm's supply chain collaboration. Majority of managers commented that decision-making is important for performance improvement in the oil and gas industry. Managers identifies infrastructure as a key performance improvement element.
E-NNPC **E-TOTAL** **E-RAIN** **E-RANO**	Majority of the participants pointed out that collaborative Relationship management is important in managing organisation activities as it can enable effective relation creation and sustain partners together to achieve the desired success. Most interviewed employees described that excellent leadership in supply chain operation provides effective supply chain management in the oil and gas industry.

	More interviewed employees have mentioned trust as the key element that improves the performance of supply chain operations in their organisation. Majority of the employees stated that collaboration enables the setting of organisational targets and goal alignment, which are vital elements for improving the performance of an organisation. Majority of the interviewed employees showcase that an organisation's adequate flow of resources can better be achieved through collaboration. This means that the effective flow of resources enables the success of an organisation. Most employees interviewed mentioned that timeliness enables an organisation the elimination of waste in the system, contributes to quicker delivery and improves customer satisfaction. Majority of the employees interviewed indicate that effective planning enables an organisation to achieve its goals and effective supply chain system by knowing exactly what to do, how, when, and where. Most interviewed employees identify quality management as an enabler used for improving the product quality of the organisation and maintaining a certain level of excellence and activities among the supply chain partners. Majority of the interviewed employees indicate that continuous improvement enables the partners to sustain the supply chain process that tent to increase profits, reduce costs and improve innovation in the oil and gas industry. They further pinpointed that Continuous Improvement provides continuous safety and improves product quality. Most interviewee identifies infrastructure development as a critical tool enabling supply chain collaboration and improving its performance. High number of interrogated employees indicate that communication channels such as social media, text messages, emails, and video conferences have improved supply chain performance in the oil and gas industry. Majority of the employees interviewed air their views stating that effective communication allows all the partners to have a clear goal, share vital information, plan, organise their supply chain activities, and encourage consumer feedback. Most interviewed employed presented that information technology, such as computing systems, the internet of things, big data etc., has facilitated the movement of oil and gas products and information sharing among the partners as well as improving the organisational performance. Majority of the employed to believe that information sharing allows supply chain partners to integrate and coordinate their supply chain processes effectively. They further added that information sharing among the partners reduces inventories, provides smooth operations and transparency, and improves supply chain performance. Most employees interviewed suggested that an effective road network is essential to their organisation because it provides smooth operations and activities during the supply chain operations. In addition, the interviewed employee added that an effective road network in their organisation reduces inventory and overall lead time, as well as saves costs, contributing to performance improvement. 16. Four employees presented in their interviews that effective financial flow of cash among the supply chain stakeholders improves supply chain collaboration as well as improving overall organisational performance. Majority of the employees interviewed believe that teamwork enables the organisation to collaborate effectively among the supply chain patterns of the oil and gas industry. Most interviewed employees presented that Policymaking becomes clearer when partners are drawn to a round table decision making which displays a high level of inclusiveness or involvement. Majority of the employees interviewed mentioned that key performance indicators are used in their organisation to evaluate the level of supply chain collaboration among the supply chain partners of the industry. More interviewed employees affirmed that Decision Making is used to provide an effective decision on information, products, and funds across the supply chain partners of the organisations. Also, it is used to resolve supply chain issues and establish a favourable policy among the supply chain partners.

	Most employees interviewed showcase their views, stating that partnership in the supply chain enables the chain members to develop effective trust and Commitment among each other, which also leads to effective relationships and performance. Most interrogated employees pointed out that cost management as an enabler of supply chain collaboration allows them to plan effectively, monitor and control their organisational budgets. Majority interrogated employees demonstrated that Commitment among the partners improves the level of trust and provides a durable relationship which leads to performance improvement in the organisation.

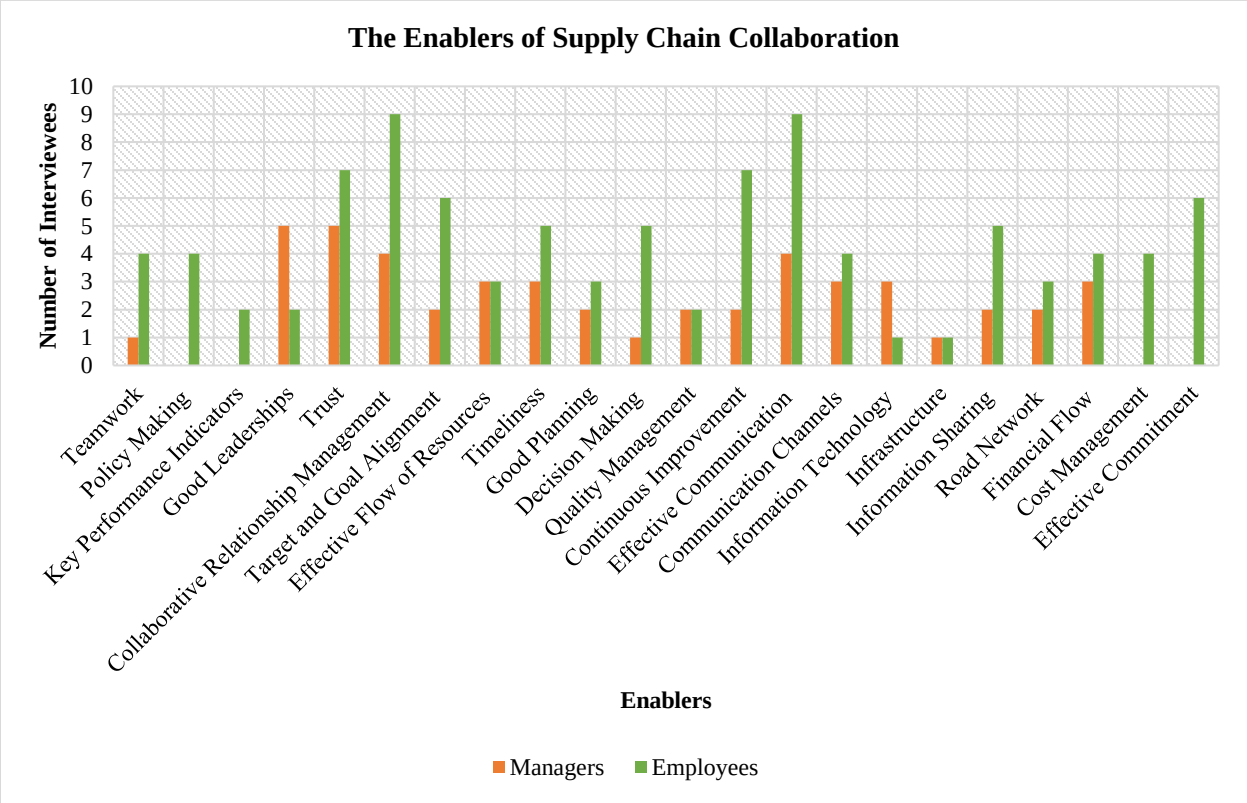

Figure 4-2: The Enablers of Supply Chain Collaborations in the Oil and Gas Industry

The Figure 4-2 and Table 4-2 show that employees value trust, collaborative relationship management, target and goal alignment, continuous improvement, effective communication, information sharing, commitment, decision-making, and timeliness as supply chain collaboration enablers. At the same time, the managers pointed out that good leadership, trust, collaborative relationship, and effective communication are the most ranked enablers of supply chain collaboration in the Nigerian oil and gas industry.

Table 4-3: Data Display on Question 3 (The Managers and Employees View)

Respondents	Question 3. What are the inhibitors of supply chain performance in the oil and gas industry?
M-NNPC **M-TOTAL** **M-RAIN** **M-RANO**	Majority of managers interviewed pointed out clearly that the Covid-19 pandemic has impacted negatively on supply chain performance due to border closure, restricted movement, social distancing, and countries lockdowns as a means to control the spread, which in turn affected so many businesses. Most interviewed managers believe poor security in the country negatively impacts the operations and performance of the supply chain, which influences collaboration.

	Majority of interviewed managers commented that poor transportation systems as a form of inhibitor in the oil and gas industry affect effective and smooth operation. Most interviewed managers pointed poor communication can significantly affect collaboration because collaboration can only be effective when there is information flow in the system. Majority of managers lamented that the lack of clear policies as a failure in leadership and trust could affect collaboration. Most interviewed managers said that lack of working capital could affect many units vital for collaboration, such as order management and day-to-day operations. Majority of managers interviewed stated that lack of manpower constitutes part of the inhibitors of the collaborative supply chain in Nigeria's oil and gas industry. Most managers interviewed mentioned a lack of commitment from the parties involved in the collaboration creating distrust among members and the team. Majority of managers interviewed commented that a lack of innovation is an inhibitor to supply chain collaboration and can negatively impact the performance of an organisation if innovation is not prioritised. Most managers commented that lack of information sharing is an inhibitor in the supply chain collaboration, pointing out that collaboration can only be effective when information is shared among the parties involved. Majority of managers interviewed mentioned order placement as an inhibitor to collaboration, especially when orders are placed late or pressure demand.
E-NNPC **E-TOTAL** **E-RAIN** **E-RANO**	Most interrogated employees made mention of border closure because of covid-19, and the country lockdown has caused a delay in the delivery of oil and gas products from the point of production to the end users. In addition, the employees noted that border closure had affected supply chain planning, time management, logistics and distribution as well as decision making of the organisation. Majority of the interviewed employees pointed out that restricted movement has negatively impacted the mode of operations in their organisation through movement restrictions imposed by the government to stop the spread of Covid-19 and thereby limit the industry's activities. More interviewed respondents said that social distancing is one of the rules and regulations implemented by the government as a measure for the spread control of Covid-19. However, it turns out to be an inhibitor to business operation as it limits the level of interaction in business activity. Most respondents identified countries' lockdowns as a barrier to the effective execution of local and international business operations, as a fleet or entire logistics were unable to distribute products and services efficiently, thereby affecting supply chain flows. Majority of the employees that participated in the interview stated that the lack of security in the country has posed a threat to the effective supply chain and thereby limits the movement of oil and gas products from one location to another. More interviewed employees said that poor transport systems in their organisation have slowed down distribution channels and damaged lots of goods due to poor road infrastructure and inadequate transportation channels in some parts of the country, which has cost the industry a lot during the supply chain process. They further added that poor transportation system also contributes to inadequate delivery of products and services to the appropriate location. Greater number of the employees interviewed stated that poor communication affects organisational productivity, decision-making, and teamwork and discourages partners' connectivity, which also leads to a lack of performance improvement in the organisation. They added that effective collaboration could only be achieved if adequate communication is practised among the supply chain stakeholders. Majority of the employees interviewed noted that poor planning because of lack of leadership in their organisation is the reason why most supply chain processes failed in their organisation. More employees that part takes in the interview mentioned that lack of clear policies due to poor leadership in their organisation affects the level of collaboration with their partners. They further added that a situation whereby clear and favourable policy is not established among the partners would lead to not improving the overall performance of the industry.

	Greater number of the employees interviewed presented that lack of working capital among the stakeholders has made supply chain operations more difficult to be achieved. The employee further added that due to a lack of working capital, businesses might be unable to cover overhead costs or fund expansion initiatives. Most employees interviewed discuss that lack of manpower affects the collaboration process in their organisation because unskilled personnel occupy most positions. They went on to say that the staff should have additional training in the future so they can develop their talents. Most senior interviewed employees mentioned that lack of commitment (not consistency) affected organisational goals, achievement, partnership relationship, trust, collaboration, and organisational performance. Majority of the interviewed employees stated that lack of innovation and creativity affects collaboration and performance as no new skills, ideas and knowledge is acquired to further enhanced the overall organisational performance. Most employees that were interrogated indicate that lack of information sharing in an organisation inhibits collaboration and the firm's overall performance. They further added that the absence of information sharing also affects the level of trust and relationships among the partners, product quality and, lastly, it affects the goals and visions of the company. Majority of the employee interviewed made mention of order placement as one of the collaborative supply chain barriers in their organisation whereby if the products ordered by the clients are not managed well will cause chaos and lead to customers' unsatisfaction.

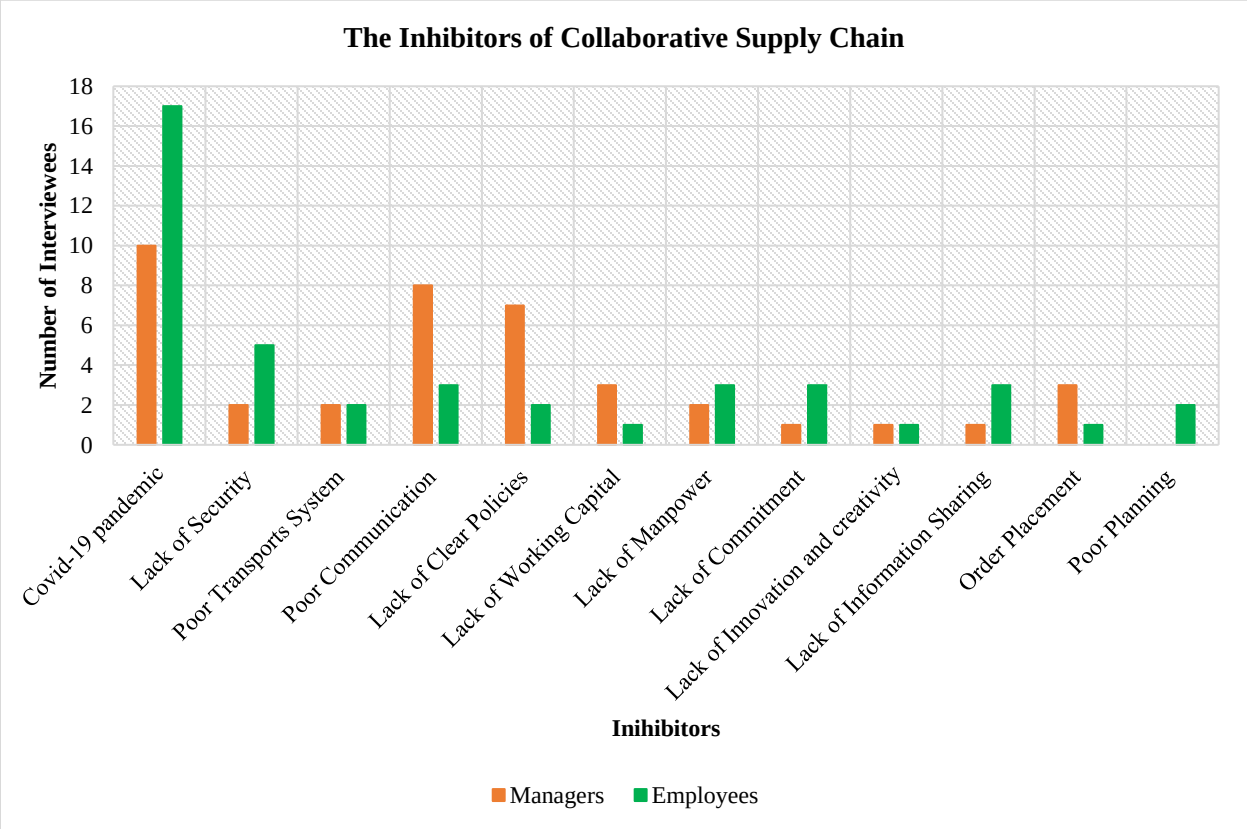

Figure 4-3: The Inhibitors of Supply Chain Collaboration in the Oil and gas Industry

Table 4-3 and Figure 4-3 show that the lack of security, the Covid-19 Pandemic, poor communication, and lack of clear policies are the key inhibitors of supply chain collaboration in

Nigeria's oil and gas industry. The participants added that the above inhibitors constrain some of the industry activities and the distribution of industrial products.

Table 4-4: Data Display on Question 4 (The Managers and Employees View)

Respondents	Question 4: What are the key strategies utilised to enhance supply chain performance?
M-NNPC **M-TOTAL** **M-RAIN** **M-RANO**	Majority of managers agreed with some of the components identified in the informed literature, which could be enablers or inhibitors to supply chain collaboration. They further suggested other strategies for implementing supply chain performance improvement, as stated below. Most managers mentioned key performance indicators as other strategies to improve performance rather than a collaborative effort. A manager interviewed mentioned monitoring and evaluation as other strategies for implementing supply chain performance improvement. Majority of managers interviewed commented that management of business structure is another strategy for implementing supply chain performance improvement, which can be achieved through environmental analysis. Most managers interviewed mentioned honesty as a critical strategy employed for implementing supply chain performance improvement. Majority of managers interviewed believe that effective communication is used in implementing supply chain performance improvement. Most managers interviewed mentioned internal development as a strategy for implementing the supply chain performance improvement. Most manager interviewed commented that effective decision-making is a strategy for implementing supply chain performance improvement. Most manager interviewed mentioned that value creation is a strategy for implementing supply chain performance improvement. Majority of the managers interviewed stated that avoiding risk-taking is a strategy for implementing supply chain performance improvement. Most managers interviewed motioned that cost reduction and unnecessary expenditures can help implement supply chain performance improvement. Majority of the managers stated that a review of performance help in the identification of opportunities that will be useful for the implementation of supply chain performance improvement. Most managers mentioned that good planning is needed to ensure effective coordination of the organisation's mission, individual strength, and effective communication.
E-NNPC **E-TOTAL** **E-RAIN** **E-RANO**	Most interviewed employees presented that key performance indicators are used by their organisation to perform business strategy and improve its performance. They also added that key performance indicators are used to set up standard measures and targeted goals for their organisation to achieve in a particular period. Furthermore, the supply chain collaborator uses key performance indicators to evaluate and monitor the collaborative firms' and partners' strategies, processes, and activities. Greater number of the employees interviewed stated that monitoring and evaluation are used in their organisations to identify the linkages between the supply chain planning, processes, and implementation to satisfy their customer need and improve the performance of the entire organisation and the industry at larger. Also, it is used to identify any existing gaps or failures in any supply chain operations. Majority of the interviewed employees demonstrated that their organisation's performance could improve through order strategies such as management of business structure and environmental analysis. The level of business structure affects the activities of the supply chain and the relationships between the company's clients and other supply chain partners. Majority of the employees interviewed, Good Planning through sharing the organisation's mission is a strategy used to improve product quality, the firm's objectives, and goals. In addition, individual strength enables organisations to understand where their strength lies in their business processes and after considering outsourcing the other businesses that they are not good at to their most trusted partner.

	Most interviewed employees believe that sharing the organisation's mission among the participating partners is another strategy that is used to improve the firm performance. They further added that it is important that all the chain members understand the collaborative mission, which will enable each of them to work towards it to have unified goals and outcomes as well as meet customer demands and satisfaction. Greater number of the employees presented that honesty is a strategy that an organisation can use to improve their organisational performance as it is the medium in which the partners develop a long-lasting relationship and meet the targeted goals such as maximising profits and customer satisfaction. Furthermore, honesty creates self-accountability and integrity for the firms and their partners. As a result, honesty improves the company's reputation and how the organisation's leaders develop confidence. It also allows the organisation to identify the problems and work together to solve them. Most interviewed employees demonstrated that Effective communication was used in their organisation as a strategy for an effective performance system before the invention of collaboration. This allowed the supply chain members to effectively share vital information, develop targeted goals, and make effective decisions. Additionally, organisational performance is improved through effective communication because it encourages functional clarity, project continuity and effective teamwork among the concerned stakeholders. Majority of the employees believe that the major goal of Internal development as another strategy for performance improvement is to enhance sales, improve efficiency, improve customer service, and assist the organisation's general growth. Most employees agreed that most organisations use effective decision-making to improve their organisational performance. They further added that effective decision-making contributes to effective organisational management, leadership, good planning, selection of appropriate resources and logistic mapping. Most participating employees argued that Value creation is a strategy for performance improvement in the absence of collaboration because it is regarded as the foundation of any successful business. It also ensures long-term customer relationships and gives your brand strong relevance among competitors. Greater number of the employees interviewed, avoiding risk-taking is another strategy the organisation employs to eliminate hazards, unwanted activities, and exposures that hurt an organisation's assets, leading to cost reduction and meeting customers' expectations. They further stated that the company's assets might be vulnerable to losses if a risk management strategy is not applied. Most participating interviewed employees, noted that avoiding unnecessary expenditures in an organisation leads to effective management of the company's production, improving customer relationships and overall organisational performance. Most employees mentioned that consistent review of performance and its measurement in their organisation had become another strategy for improving organisational performance. Performance reviews provide valuable inputs to the company as well as getting valuable feedback from their most trusted clients or customers. However, performance evaluations as a strategy in an organisation reveal problem areas and offer remedies.

The Figure 4-4 and

Table 4-4 highlighted the other strategies for performance improvement, such as good planning, monitoring and evaluation, key performance indicators and effective communication. The participant added that this other strategy enables them to overcome the organisational uncertainties where some of these partners may need more capacity to meet the requirement for effective supply chain collaboration. Also, some participants pointed out that most of these strategies for effective performance systems had been placed in their organisations before the invention of supply chain collaboration.

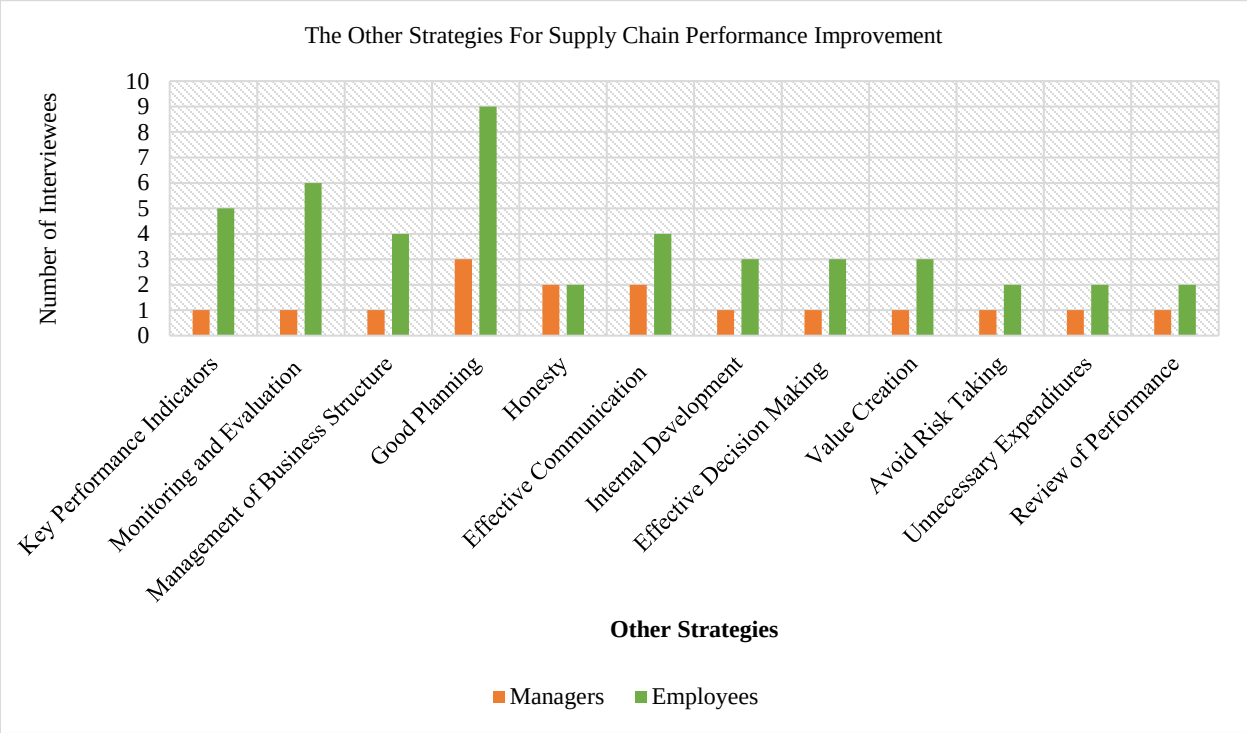

Figure 4-4: The other strategies for performance improvement in the oil and gas industry

4.8 Data Pattern Identification

A theme is a pattern that captures the associated information in data and groups them based on their similarities or closely related to the subject of discussion (Braun & Clarke, 2006). A theme in the thematic analysis is a pattern that describes ideas that are important in research or areas that sufficiently capture the critical views in data and research questions (Braun & Clarke, 2006). Braun and Clarke (2006), further state that themes are constructed to summarise the components that represent the overall views of participants. The data revealed 16 key components identified as findings, and elements such as trust, information sharing, communication, commitment and infrastructure and risk management in some areas of the research questions were overlapped and merged. For example, as mentioned by the interviewees, trust and good leadership are good enabling factors and could be found as inhibitors to the organisation.

At the end of the data summary and display in broader views, as highlighted above, a thematic pattern identification process is applied to bring the data to something specific about these research questions (Q1-Q4). The frequency is presented in percentage in the tables below, see appendix D. This research predominately uses descriptive themes, which explain patterns in the data

appropriate to the research questions. The tables below display themes that are identified in question 1 to 4 based on the response of managers and employees interviewed. The key patterns and findings are presented in Tables below.

Alignment of Goals

Determine and Defining Key Themes was the first stage which the researcher determine and identify the key themes or areas of concentration that are critical to the success of the organisation. Alignment of Goals, Trust, Connectivity with Suppliers, Effective Operations, Customers' Satisfaction, and Good Relationship are the core areas in this scenario mentioned by majority of the respondents. These themes stand for several elements that affect how well the organisation performs overall.

Setting precise goals for each topic comes after the themes have been selected. Objectives give direction and specify the goals or objectives for each subject. Establishing trustworthy and open lines of communication with stakeholders, for instance, can be a target under the topic of trust.

Alignment is a process that is continuous. The company need to promote a culture of ongoing development and education. To collect feedback from diverse stakeholders and incorporate it into the alignment process, feedback loops should be built. This makes it possible for the organisation to adjust to shifting conditions while staying committed to attaining its objectives.

Teamwork

The idea was to decide on the concept of teamwork as a primary area of attention. Understanding the value of teamwork is crucial for promoting cooperation and attaining shared objectives inside the organisation.

Once the teamwork theme was established, it was crucial to specify specific goals for strengthening and fostering effective teamwork. These goals include enhancing communication through information sharing, cost reduction, and good leadership that fosters respect for one another, encourages teamwork, and advances a sense of purpose that is universal which were drawn from the majority views of respondents.

It was critical to comprehend the obstacles and difficulties that prevent productive collaboration. This can be caused by things like a lack of channels for communication, competing priorities or goals, insufficient leadership backing, or a culture that doesn't encourage cooperation.

Performance Management

Here, it was considered to identify the themes that make performance management a major area of concern. Input and output, flexibility, effective time management, and decision-making are just a few of the activities and processes that are included in performance management, which aims to boost both individual and organisational performance.

It was crucial to establish precise goals for improving performance after the theme of performance management has been determined. These goals involve defining precise performance benchmarks, developing performance measures and indicators, offering feedback, and coaching, and coordinating team and individual goals with those of the organisation which captured by majority of the respondents.

These results from the defined processes can assist organisations in setting up a strong performance management system that focuses on enhancing both individual and organisational performance. It guarantees that teams and people are supported to succeed, that performance objectives are transparent, and that feedback is delivered often. Increased output, staff engagement, and overall organisational success are all influenced by effective performance management. Summary of the key patterns and findings in the table 5.5 below.

Table 4-5: Q1-Adoption of supply chain collaboration for performance improvement in the oil and gas industry

Key patterns	**Frequencies in %**	**Findings**
Goals Alignment (GA)	3**%**	Alignment of goals
Trust	43**%**	
Connectivity with Suppliers (CWS)	17**%**	
Effective Operations (EO)	17**%**	
Customers' Satisfaction (CS)	17**%**	
Good Relationship (GR)	7**%**	
Teamwork	13**%**	Teamwork
Information Sharing (IS)	47**%**	
Costs Reduction (CR)	13**%**	
Good Leadership (GL)	17**%**	
Performance Management (PM)	7**%**	Performance Management
Input and Output (I&O)	7**%**	

Flexibility	30%	
Effective Time Management	30%	
Decision Making (DM)	13%	

Collaborative relationship management

The establishment and maintenance of fruitful and productive partnerships with internal and external stakeholders are part of collaborative relationship management. This was accomplished by choosing respondents' opinions that shared the majority perspective.

Specific objectives for collaborative relationship management are developed once the subject has been determined. These aims include encouraging open communication, creating a sense of trust, advancing understanding between parties, developing collaboration, and accomplishing common objectives with stakeholders. Teamwork and collaborative relationship management are among the topics. In response to the question on the facilitators of supply chain collaboration leading to performance improvement, respondents highlighted the importance of good leadership, trust, collaborative relationships, target and objective alignment, and effective resource flow.

Timeliness and order planning

Planning for timeliness and order include setting priorities for activities, managing time efficiently, and developing a structured workflow. Effective time management and good planning, which were frequently highlighted by respondents, can, nevertheless, help achieve this objective.

Specific goals pertaining to timeliness and order planning are set once the subject has been determined. These goals could include completing tasks before the deadline, making the most use of available time, avoiding procrastination, boosting productivity, and keeping a tidy workspace.

Quality Management

The designation of the topic of quality management as a crucial area of concentration. In order to guarantee that goods, services, and processes meet or exceed consumer expectations and organisational requirements, quality management procedures must be put into place. The selected Quality Management and Quality management were determined by the respondents' opinions. The most often highlighted areas were continuous improvement.

Specific quality management objectives are developed once the subject has been determined. These goals may include raising customer happiness, minimising mistakes, or faults, and fostering a culture of ongoing improvement.

Infrastructure

Infrastructure is a basic concept that includes all physical facilities, processes, and structures required for a society or organisation to function. It entails the development, upkeep, and administration of critical infrastructure, such as buildings, roads, bridges, power plants, water supply networks, and others. The infrastructure theme lays the groundwork for societal advancement, economic expansion, and general advancement.

Most respondents' views centred on effective communication, communication channels, information technology, information sharing, and road network. Because these themes were related in nature and clustered together, infrastructure development could be carried out methodically and effectively if these issues were considered. Each subject is essential for making sure infrastructure projects are properly planned, communicated, backed by the right technology, and carried out in a way that encourages cooperation and information exchange among stakeholders.

Decision Making

The process of choosing among several options and picking a plan of action is the main emphasis of the decision-making subject. It entails assessing the information that is available, weighing the pros and drawbacks of various possibilities, and eventually deciding on the best course of action to take in order to accomplish the intended results. This theme was identified from the group of ideas presented by majority respondents who mentioned Policy Making, Key Performance Indicators, Costs Management, and Effective Commitment as part of decision making that is an essential part of every organisation's or person's operations.

Analysing performance indicators, controlling expenses, keeping decision makers actively engaged, and considering policies and standards are all part of the thematic process that precedes decision-making. By incorporating these elements, organisations may create a structured decision-making process where decisions are backed by the right resources, based on trustworthy

information, and aligned with policies. This procedure makes it possible to make decisions that are successful for the organisation and are efficient and effective.

Finance

The planning, organising, directing, and managing of all financial operations inside an organisation constitutes the essential topic of financial management. Financial decision-making, budgeting, financial analysis, and resource management are all part of it. Achieving organisational objectives requires efficient and strategic resource allocation, which is ensured by effective financial management. This theme was mentioned by majority of the respondents for this study. Summary of the key patterns and findings in the table 5.6 below.

Table 4-6: Q2-The enablers of supply chain collaboration leading performance improvement in the oil and gas industry

Key patterns	**Frequencies in %**	**Findings**
Teamwork	17%	Collaborative Relationship management
Good Leadership (GL)	23%	
Trust	40%	
Collaborative Relationship (CR)	43%	
Target and goal alignment (TGA)	27%	
Effective Flow of resources (EFR)	20%	
Time management (TM)	27%	Timeliness and order planning
Good Planning	17%	
Quality Management (QM)	13%	Quality management
Continuous Improvement (CI)	30%	
Infrastructure	7%	Infrastructure
Effective Communication (EC)	43%	
Communication Channels (CC)	23%	
Information Technology (IT)	13%	
Information Sharing (IS)	23%	
Road Network (RN)	17%	
Decision Making (DM)	20%	Decision Making
Policy Making (PM)	13%	
Key Performance Indicators (KPIs)	7%	
Costs Management (CM)	13%	
Effective Commitment (EC)	20%	
Effective Financial Flow (EFF)	23%	Finance

Covid-19 Pandemic

Disruptions in the supply chain are problems that businesses have when sourcing, producing, and distributing their products and services. Due to several constraints like plant closures, workforce

shortages, transportation limitations, and decreased consumer demand, the Covid-19 epidemic created substantial disruptions throughout supply chains. The focus of the subject is on how these interruptions impacted the flow of products and services and decreased the efficiency of the supply chain.

The global health crisis, which prompted supply chain disruptions, produced demand-supply imbalances, imposed logistics and transportation constraints, and highlighted the need for resilience and adaptability, is the thematic process that led to the Covid-19 pandemic as an inhibitor of supply chain performance. These related ideas highlight the many difficulties supply networks had throughout the pandemic, which resulted in a decline in their overall performance.

Infrastructural Development

Infrastructural development is the product of a conceptual process that also addresses issues with security, transportation, and communication infrastructure. Governments, organisations, and stakeholders can encourage and support infrastructure development by taking into account and addressing these topics. To complete this process, it is necessary to put security measures in place to inspire trust, invest in transportation infrastructure to increase connection and accessibility, and build trustworthy communication networks to aid in project coordination and information exchange. When combined, these initiatives help an area or nation's infrastructure to advance and grow.

Poor Leadership

The thematic process resulting in poor leadership as theme was from elements like unclear policies, a lack of operating capital, a lack of personnel, a lack of dedication, a lack of innovation and creativity, a lack of information sharing, issues with order placement, and poor planning mentioned by participants are all part of the theme process that leads to poor leadership. Organisations can work to enhance leadership techniques, cultivate a culture of wise decision-making, and promote the overall development and success of the organisation by recognising and addressing these topics. Summary of the key patterns and findings in the table 5.7 below.

Table 4-7: Q3-The inhibitors of supply chain performance in the oil and gas industry.

Key patterns	Frequencies in %	Findings
Covid-19 pandemic	90%	Covid-19 pandemic
Lack of Security (LS)	23%	Infrastructural development
Poor Transport Systems (PTS)	13%	
Poor Communication (PC)	37%	
Lack of Clear Policies (LCP)	30%	Poor Leadership
Lack of Working Capital (LWC)	13%	
Lack of Manpower (LM)	17%	
Lack of Commitment (LC)	13%	
Lack of Innovation and Creativity (LIC)	7%	
Lack of Information Sharing (LIS)	13%	
Order placement (OP)	13%	
Poor Planning (PP)	7%	

Process Monitoring and Evaluation

The key pattern was identified through the thematic process that leads to process monitoring and evaluation. Key performance indicators (KPIs) are used to measure performance, monitoring and evaluation (M&E) processes are put into place to collect data and evaluate results, and a strong business structure is established to support these activities which frequently mentioned by majority of participants and their views were cluster together and form the finding. By incorporating these elements, organisations can create a methodical monitoring and evaluation methodology, allowing them to pinpoint areas of success, areas for development, and take the required steps to enhance performance. Enhancing efficiency, effectiveness, and overall organisational performance requires careful process monitoring and assessment.

Business Strategy

Incorporating honesty and fostering good communication as mentioned by majority of respondents. This can be achieved by doing market analysis, participating in financial planning, and encouraging innovation and flexibility are all part of the conceptual process that results in business strategy. Together, these themes influence how a business strategy is developed and carried out, ensuring that it is in line with the organisation's beliefs, goals, and market realities.

Business strategy offers a road map for attaining long-term success, competitiveness, and sustainable growth.

Training

Internal development efforts, effective decision-making, skill development, information transfer, and performance improvement which was mentioned by majority of participants as part of the theme process that leads to training. Organisations may promote a culture of learning and development, strengthen staff competencies, and promote continuous improvement by identifying and addressing these issues. Training programmes are advantageous to both individual employees and the development, growth, and competitiveness of the organisation as a whole.

Good Planning

Consideration of value creation, avoiding risk-taking, minimising unnecessary expenditures, and incorporation of a performance assessment which was frequently mentioned by majority of respondents as parts of the theme process that leads to excellent planning. By including these elements, organisations may construct thorough and efficient plans that support their objectives, benefit stakeholders, and reduce possible risks. Organisations may manage difficulties, grasp opportunities, and achieve long-term success with the help of good planning.

Summary of the key patterns and findings in the table 5.8 below.

Table 4-8: Q4- What are the key strategies utilised to enhance supply chain performance?

Key patterns	**Frequencies in %**	**Findings**
Key Performance Indicators	20%	Process monitoring and evaluation
Monitoring and Evaluation	23%	
Management of Business Structure	17%	
Honesty	13%	Business Strategy
Effective Communication	20%	
Internal Development	13%	Training
Effective Decision Making	13%	
Good Planning	40%	Good planning
Value Creation	13%	
Avoid risk Taking	10%	
Unnecessary Expenditures	10%	
Review of Performance	10%	

4.9 Analysis and Findings

The above-mentioned findings are analysed and explored in connection to the four primary study issues stated. These research questions serve as a foundation for investigating the issue at hand and give a thorough comprehension of it.

Question 1

Based on the information supplied by respondents, the researcher performed a study to identify key themes or areas of focus that are crucial to the organisation's performance. Goals Alignment, Trust, Connectivity with Suppliers, Effective Operations, Customer Satisfaction, and Good Relationship were among the themes stated by most respondents.

To answer question 1, after identifying the results, the next step was to create specific goals for each finding. These objectives are specified in each area and offer guidance.

The process of alignment is regarded as continual, and the business is urged to foster a culture of constant learning and development. To gather feedback from many stakeholders and incorporate it into the alignment process, feedback loops should be built. This enables the organisation to adjust to changing circumstances while remaining dedicated to attaining its goals.

The emphasis is placed mostly on teamwork. It is underlined how important collaboration is for fostering cooperation and attaining common goals within an organisation. There are listed specific objectives for developing and cultivating successful cooperation, such as improving communication, cutting expenses, and supporting excellent leadership that encourages respect, teamwork, and a shared sense of purpose.

Another significant area is performance management which is with the objective of enhancing both individual and organisational performance, it includes actions and procedures including input and output, adaptability, efficient time management, and decision-making. It is advised to set specific performance improvement objectives, such as establishing performance benchmarks, creating performance metrics and indicators, giving feedback, and coaching, and coordinating team and individual goals with organisational objectives.

The results indicate that the business should concentrate on matching its objectives with important ideas, encouraging cooperation, and putting in place a successful performance management

system. By doing this, the firm may succeed, improve overall performance, and boost employee engagement.

Question 2

The researcher established a number of important elements that are crucial and act as enablers for the development of the business to solve concerns linked to question 2 based on the information supplied. These areas covered include decision-making, infrastructure, quality management, timely and orderly planning, collaborative relationship management, and finances. According to the results, these areas should get focus, and precise objectives should be established to boost performance of the organisation.

The development and maintenance of successful alliances with internal and external stakeholders are stressed in collaborative relationship management. Promoting open communication, trust, understanding, cooperation, and attaining shared goals with stakeholders are the specific goals as the enablers of supply chain collaboration leading to performance improvement, it was noted that strong leadership, trust, collaborative relationships, target and objective alignment, and efficient resource flow were important.

Planning for timeliness and orderliness focuses on creating an organised process, identifying priorities, and effectively managing time. Goals in this area might be as specific as meeting deadlines, making the most of free time, preventing procrastination, increasing productivity, and keeping a clean workstation. Time management skills and thorough planning were frequently mentioned by respondents.

To make sure that products, services, and procedures meet or exceed customer expectations and organisational standards, quality management is seen as a vital area of focus. The significance of continuous improvement was emphasised as a crucial component of quality management. Raising customer happiness, reducing errors or flaws, and promoting a culture of continuous improvement are some examples of specific goals.

The physical procedures, buildings, and facilities required for a society or organisation to operate are referred to as infrastructure. Road networks, information technology, knowledge exchange, and effective communication were cited as key elements in infrastructure development. These are

necessary for effectively organising, informing, and executing infrastructure projects in a way that promotes collaboration and information sharing among stakeholders.

Making decisions entails evaluating information, considering benefits and drawbacks, and deciding on the best course of action. The decision-making process was described in terms of key performance metrics, cost management, and effective commitment. Important elements in the decision-making process include analysing performance indicators, managing expenditures, keeping decision-makers involved, and taking rules and standards into account.

Planning, coordinating, directing, and managing all financial processes within an organisation are all parts of financial management. Key elements include resource management, budgeting, financial analysis, and financial decision-making. Achieving organisational goals requires efficient and strategic resource allocation, which is ensured by effective financial management.

The results indicate that as enablers of organisational performance development, focus should be placed on collaborative relationship management, timeliness and order planning, quality management, infrastructure, decision making, and financial management. For each selected enabling theme, specific objectives should be established to boost organisational success and performance.

Question 3

The results show how the Covid-19 epidemic has affected supply chains, causing interruptions in the sourcing, production, and distribution procedures. Constraints that had a substantial impact on the flow of goods and services and reduced supply chain effectiveness include plant closures, labour shortages, transportation issues, and a decline in consumer demand. Disruptions in the supply chain brought forth by the pandemic led to demand-supply mismatches, transportation and logistical problems, and the need for resilience and adaptation.

It is emphasised that infrastructure development is a crucial component in solving problems with infrastructure related to security, transportation, and communications. To make project coordination and information sharing easier, governments, organisations, and stakeholders are urged to invest in security measures, transportation infrastructure, and reliable communication networks. These programmes may help an organisation's infrastructure develop and improve.

Another important factor influencing organisational effectiveness is poor leadership. Poor leadership is characterised by factors including ambiguous policies, a lack of operational capital, a lack of staff, a lack of commitment, a lack of invention and creativity, a lack of information sharing, problems with order placement, and bad planning. Organisations are recommended to enhance leadership practises, encourage a culture of sensible decision-making, and support overall organisational development and success to address this issue.

The research points out the difficulties the Covid-19 epidemic poses for supply chains, the significance of infrastructure development, and the demand for strong leadership. By addressing these problems, organisations may better manage interruptions, improve supply chain efficiency, and guarantee long-term success.

Question 4

The findings emphasise numerous key aspects relating to process monitoring and assessment, corporate strategy, training, and excellent planning to overcome the problems connected to question 4.

A crucial trend is the identification of process monitoring and assessment. It entails developing a solid corporate structure to support these operations, putting monitoring and evaluation (M&E) systems in place to gather data and analyse results, and employing key performance indicators (KPIs) to measure performance. By embracing these components, organisations may create a systematic framework for monitoring and evaluating its performance that helps them pinpoint areas where they are succeeding and where they can make improvements. This improves their efficiency, effectiveness, and overall organisational performance.

The finding of business strategy also came up. It entails embracing integrity, creating effective communication, performing market research, taking part in financial planning, and supporting creativity and adaptability. These themes have an impact on the formulation and application of a business strategy that is consistent with the organisation's values, objectives, and market realities. For long-term success, competitiveness, and sustainable growth, a well-defined company strategy offers a road map.

The enhancement of performance, internal development initiatives, efficient decision-making, skill development, and knowledge transmission are all regarded as essential themes that relate to

training. By addressing these problems, organisations may encourage a culture of learning and growth, boost staff capabilities, and support continuous improvement. The development, expansion, and competitiveness of the organisation as well as the individual workers gain from training programmes.

The need of good planning is emphasised as a finding that includes taking performance assessment into account, keeping risk to a minimum, and not taking unnecessary risks. Organisations may create complete and effective plans that support its aims, benefit stakeholders, and reduce possible risks by including these components into their planning processes. Organisations may handle difficulties, grasp opportunities, and achieve long-term success with the help of good planning.

The results point to the significance of corporate strategy, planning, training, process monitoring and evaluation, and excellent planning in raising organisational performance. Organisations may increase its effectiveness, competitiveness, and long-term success by addressing these areas and adopting them into its operations.

4.10 Model development

After the original data has been analysed, the findings are presented in broad strokes or in sections based on the research's major issues. 16 important parts of the findings were identified during thematic process. Alignment of goals, teamwork, decision-making, performance management, collaborative relationship management, timeliness and order management, quality management, finance, process monitoring and evaluation, management of business strategy, training and development, infrastructure, good planning, Covid-19, infrastructural development, and other novel ideas that have been researched and added to the body of knowledge and practise in the oil and gas industry. The study findings are summarised and presented in the model development in Figure 4-5.

Numerous academic research paradigms were discovered by Creswell and Creswell's 2003 study. The long-standing models for supply chain collaboration needed to be updated after a careful analysis of the current ones. This allows the researcher to take advantage of new technologies, adapt to shifting market dynamics, increase efficiency, boost customer satisfaction, manage risks like pandemics, and use alternative practises for performance improvement. It is important to know that a business environment is always changing. The new model brings together components to

enable businesses to remain resilient and competitive. In order to visualise the relationships between various items in a system, the domain model diagram presented in this study helps pinpoint possible areas for development and offers a thorough grasp of how the various parts of a system interact. Development of a domain model for supply chain collaboration that can improve performance in the oil and gas industry in Nigeria presented below.

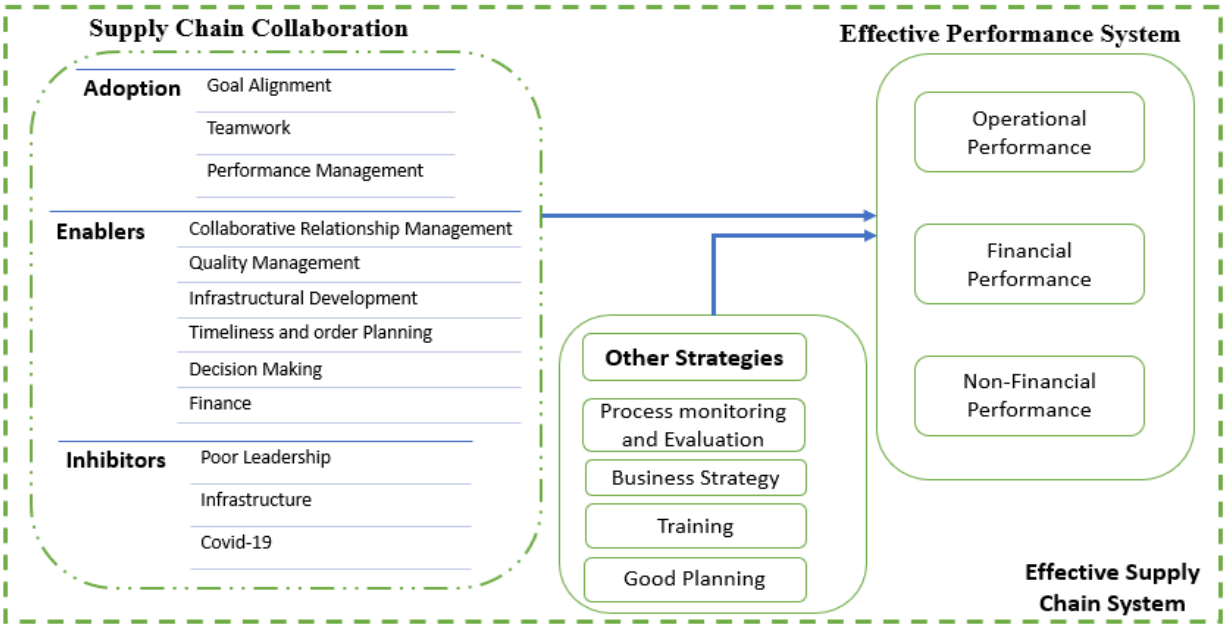

Figure 4-5: Model Development for Effective Supply Chain Collaboration leading to performance Improvement.

Operations Performance

Operational performance is used to describe the efficacy and efficiency of a company's primary operations and procedures. It focuses on how successfully an organisation carries out its regular tasks to meet its strategic goals. Productivity, quality, customer happiness, cycle time, and on-time delivery are a few examples of key operational performance metrics. High operational performance suggests that a company is efficiently using its resources, streamlining operations, and providing goods or services.

Financial Performance

An organisation's financial success is determined by its ability to turn a profit, control expenses, and increase shareholder value. In order to evaluate an organisation's overall financial health and viability, financial statements and indicators must be analysed. Revenue growth, profitability,

return on investment (ROI), gross margin, liquidity ratios, and the debt-to-equity ratio are important financial performance metrics. Positive financial performance demonstrates that a company is bringing in money, controlling costs, and producing long-term profits.

Non-Financial Performance

Non-financial performance is the assessment of an organisation's success or development based on elements unrelated to financial metrics. It includes a larger range of metrics that evaluate the organisation's influence on key constituencies, society, and the environment. Social responsibility programmes, employee happiness, environmental sustainability practises, innovation, and brand reputation are examples of non-financial performance measures. Organisations may comprehend their influence beyond financial results and consider their social and environmental obligations by evaluating non-financial performance.

4.11 Novelty of the research

The study revealed a good relationship between the literature and the primary data, as sixteen important parts of the findings were identified during the thematic process, which include alignment of goals, teamwork, decision-making, performance management, collaborative relationship management, timeliness and order management, quality management, finance, process monitoring and evaluation, management of business strategy, training and development, infrastructure, and good planning. These parts were found to be similar and consistent with the existing literature. The COVID-19 pandemic, infrastructural development, and poor leadership were novel ideas as barriers to supply chain collaboration, and the development of or highlighting other strategies that have been researched and added to the body of knowledge was a unique contribution that has not in the existing models.

It is crucial to remember that uniqueness is typically evaluated in the context of a particular industry or area of expertise. The primary topic of this study is supply chain collaboration as a crucial element of performance improvement in the oil and gas sector. As a result, something that may be original in one discipline but not in another may not be unique in that field. Furthermore, novelty alone does not guarantee the significance or influence of study results. Research's relevance is based on more than simply its uniqueness; it also involves its contribution to

knowledge, its applicability in daily life, and its potential consequences on further studies or applications, of which both aspects are true and reflected in this study.

A unique contribution is the creation of a performance improvement model specifically designed for the Nigerian oil and gas industry. The complexity of the industry is taken into account in this approach, providing exact instructions on how to improve cooperation for performance growth.

In conclusion, the novelty of this research lies in its industry-specific focus, the development of a customised performance improvement model, and its ability to provide insightful knowledge for supply chain collaboration in other challenging and dynamic industries, in addition to the Nigerian oil and gas industry. Furthermore, Local context sensitivity, performance improvement perspective, validation through a real-world Validation, holistic framework, and scalability and adaptability are the main novelty in comparison with the existing one. These factors combine to present our concept as a cutting-edge solution for improving collaboration and performance in this vital area.

The linkages between components of supply chain collaboration and performance improvement.

The effects of each result on operational performance, financial performance, and non-financial performance may differ depending on the industry, setting, and unique organisational features. The connections between the findings of supply chain collaboration and performance improvement are summarised in the Table 4-9.

Table 4-9: Research Findings leading to Performance Improvement

Findings	**Operational Performance**	**Financial Performance**	**Non-Financial Performance**
Alignment of goals	Improves coordination, efficiency, and goal attainment	Enhances cost management and resource allocation	Promotes organisational cohesion and employee satisfaction
Teamwork	Enhances collaboration, communication, and productivity	Reduces costs through streamlined processes and reduced errors	Fosters a positive work environment and employee engagement
Decision-making	Supports effective and informed decision-making processes	Optimises resource allocation and cost control	Enhances organisational agility and responsiveness

Performance management	Enables performance monitoring, evaluation, and improvement	Supports cost control and resource optimisation	Encourages individual and team performance improvement
Collaborative relationship mgmt.	Enhances coordination, trust, and cooperation among supply chain partners	Improves cost efficiency and resource utilisation	Builds long-term partnerships and enhances customer satisfaction
Timeliness and order management	Ensures timely delivery of products and services	Minimises costs through efficient order fulfilment	Enhances customer satisfaction and loyalty
Quality management	Ensures high product/service quality and customer satisfaction	Reduces costs associated with rework, returns, and customer complaints	Builds brand reputation and customer trust
Finance	Optimises financial resources, budgeting, and cost control	Drives profitability and financial stability	Supports investment decisions and growth strategies
Process monitoring and evaluation	Facilitates continuous process improvement and performance tracking	Identifies cost-saving opportunities and efficiency gaps	Drives process efficiency and optimisation
Business strategy management	Aligns operations with strategic objectives and market demands	Supports revenue growth and competitive advantage	Ensures organisational sustainability and market relevance
Training and development	Enhances employee skills, knowledge, and performance	Reduces costs associated with employee turnover and low productivity	Fosters employee satisfaction, loyalty, and career growth
Infrastructure	Provides necessary physical and technological resources for operations	Impacts capital expenditure and operational costs	Supports efficient and effective operations
Good planning	Optimizes resource allocation, scheduling, and capacity management	Reduces costs associated with inefficiencies and disruptions	Enhances operational efficiency and delivery performance
COVID-19	Highlights the need for resilience, adaptability, and risk management	Impacts financial stability and operational costs	Addresses the well-being and safety of employees and customers
Infrastructural development	Supports expansion, efficiency, and technological advancements	Influences capital expenditure and operational costs	Enhances operational capacity and competitiveness

Poor leadership	Negatively impacts organisational culture, decision-making, and performance	Can lead to financial mismanagement and inefficiencies	Affects employee morale, engagement, and overall organisational health

4.12 Chapter Summary

In summary, operational performance focuses on the effectiveness and efficiency of an organisation's core operations, financial performance assesses the company's financial stability and profitability, and non-financial performance evaluates the business's effect on stakeholders and society beyond financial measures. When assessing a company's overall performance and sustainability, all three factors are crucial.

The next chapter presents the validation of the Interview findings, which details the validation process, means of validation and validation outcome. Also, the next chapter presents the model development and validation processes and procedures involved in the Model validation leading to the implementation of an effective supply chain system in Nigeria's oil and gas industry. In addition, the next chapter explores a domain model, which displays the interconnections between the interview findings leading to performance improvement in Nigeria’s oil and gas sector.

Chapter 5 : Validation of Research Findings, And Model Development

5.1 Validation Process for Research Findings

This chapter presents a validation process of the interview findings of the study. This validation aims to confirm whether the interview designs are appropriate and the findings are properly obtained to support the research aim (Saunders et al., 2020). Validity of findings are crucial because they determine whether or not a given approach or metric is adequate for determining whether or not a given system will succeed in accomplishing its goals by using the identified components. It is essential to note that the measures for the suitability of any data set are the determination of validity, which implies providing the required answers to the questions (Shafer & Herrera, 2009). The summary of the validity process and data triangulation adopted by the researcher is shown in Table 5-1.

Table 5-1: The summary of the validity and reliability process and data triangulation

Methods	Measurement	Outcomes
Validity	To understand the accuracy of a measure	Determine whether the results of a study do correspond to what they are meant to measure.
Data triangulation	To have an in-depth understanding of the subject matter	Make use of data from various spaces, times, and population

It is obvious that the main research findings should be validated through the triangulation method, and it enables the researcher to display fair judgment over the subjective data that the participants or respondents have communicated during the interview process. After collecting interview data, it was important to revisit them and inquire if the researcher got their ideas right as they had been revealed or communicated. The researcher contacted four respondents from the four studied companies, and the respondents confirmed the information's originality.

Saunders et al. (2016) suggest that the validity and reliability of study findings or collected data can be affected by reasons such as history, testing, subject error, time error, observer effects, instrumentation, mortality, maturation, and indecision about the fundamental objective of the study context. Therefore, the researcher considers all the elements and carefully follows the structure of the study from data collection, transcription and interpretation, pattern development and identification of the findings.

This subsection reviews the sixteen findings driven from the interview which include alignment of goals, teamwork, performance management, relationship management, timeliness and order

management, quality management, finance, infrastructure, process monitoring and evaluation, business strategy management, decision-making, training and development, good planning, Covid-19, infrastructure development, and poor leadership. These findings were identified through thematic patterns from the data collected, as summarised in Figure 5-1.

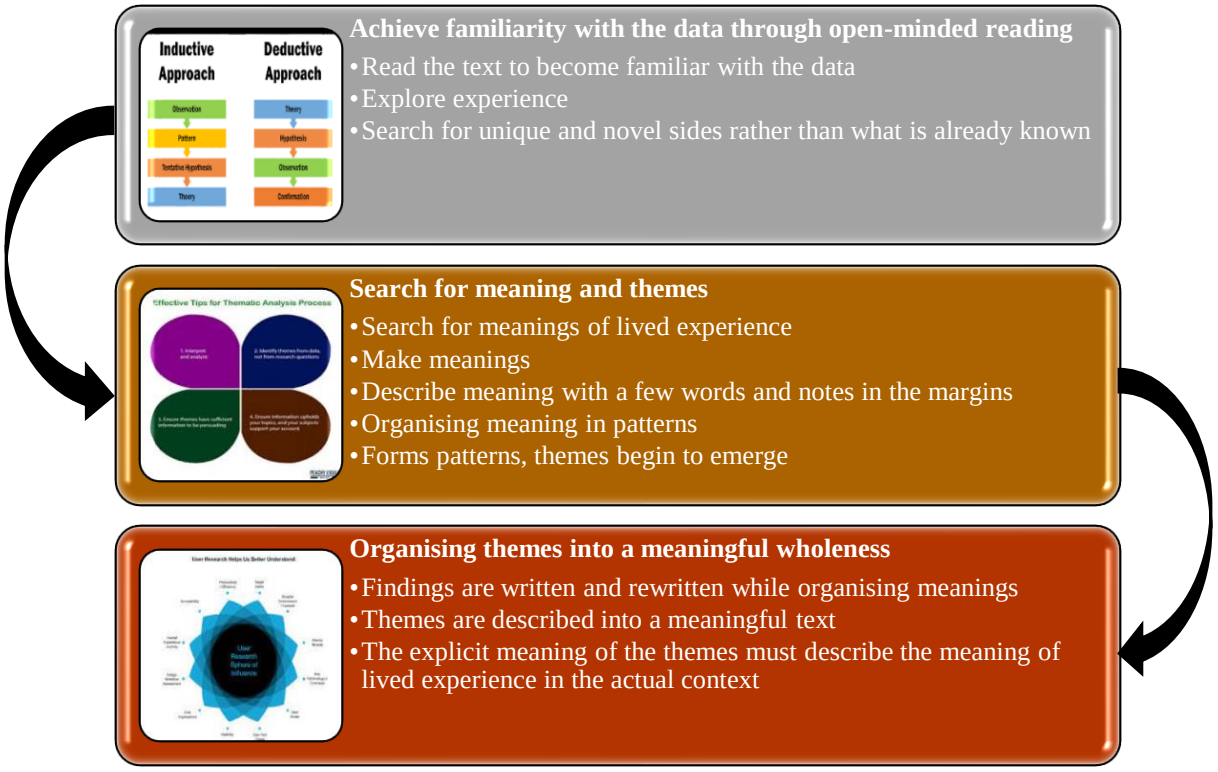

Figure 5-1: The Framework of the Thematic Analysis Summary.
Source: Adapted from the Blandford et al. (2016); Clarke and Braun (2013)

The main purpose of validation is to make sure that the interview findings is validated thorough and holds the highest quality standard and provides exact solutions to a problem. The stages for achieving quality include planning the conduct by selecting the right companies, executing the study as it should be, and evaluating whether the study findings are measured and valid.

5.2 Validation Questions

The questions below were asked of respondents to obtain a proper response from the industry. The validation questions further provide clarity, consistency, and reliability of the research findings. *Question 1* looks at the respondents' understanding of performance improvement and examines how well the findings on the relationship between supply chain collaboration and performance improvement aligned with their understanding. *Question 2* seeks to validate the identified enablers

of the research findings that tend to contribute to the overall performance improvement of the industry. While *Question 3* aimed at validating the identified inhibitors of the research findings that inhibit the effective performance of the oil and gas industry in Nigeria. The respondents were selected from the four selected oil and gas companies in Nigeria.

The Q1 to Q4 below are the questions used to validate research findings from the research context.

Q1: What is your understanding of performance improvement?

Q2: Can you confirm that the identified components from the research constitute enablers of supply chain collaboration leading to performance improvement in the oil and gas supply chain?

Q3: Can you confirm that the identified components from the study are inhibitors of supply chain collaboration leading to performance improvement in the oil and gas supply chain?

Q4: Can you confirm that the identified other strategies from the study can employed for performance improvement?

5.3 Means of Validation

A sample of four participants working within the same oil and gas companies in Nigeria was selected. They were supplied with the interview findings to analyse and validate against what they have in place. This made it easy to return and collect all the validated data sets.

After successfully identifying the study patterns that form the findings, the researcher decided to validate the findings to ensure their viability in solving the problems and the findings are components for the development of the study model that provides the necessary elements for improving performance in the oil and gas industry. As a result, semi-structured interview questions were sent out to participants through “google form” and the validation interview process were followed later with the selected senior managers who were not involved in the first data collection process (see Table 5-2).

5.4 Selection of Respondents for validation

Four different senior managers from the same companies interviewed were selected for the validation of the information collected to establish the validity of the study findings. The selected managers were in the field of operations and supply chain in Nigeria's oil and gas sector. The

selected managers were chosen based on their experience, role and responsibilities in the oil and gas companies and their capability to participate in the validation process. The employee was not included in the data validation process as it was in chapter 5 is due to limited selection of the participants (Interviewees). Top executives in their respective businesses often have a wealth of knowledge and experience in supply chain management. Because they have a thorough awareness of the intricacies and difficulties associated with supply chain operations, their views and understanding can be a significant source of validation for the study's findings. For any suggested policies or changes to be implemented successfully, top managers must provide their input and approval as decision-makers inside their organisations. They are included to make that the study's suggestions are feasible to implement and correspond with the organisation's strategic goals. The supply chain activities of the company are frequently seen holistically by managers. They are able to determine how various elements of the supply chain, such as distribution, inventory control, and logistics, may be impacted by the suggested modifications or results of the study.

Furthermore, this study outcome was validated through the top management (Managers) with vase knowledge of supply chain activities in the oil and gas industry who were decision makers and have ability to implement policies of the organisation. It was necessary to conduct the validation using the same companies but involving different participants to have a broader perspective, avoid research bias and improve validity. Using the same companies to verify the interview findings was a priority for the researcher because they are major oil and gas corporations, and the researcher could easily reach out to the top chosen managers through the google form for validation of the opinions or views.

Table 5-2: The biography of Research findings Validation respondents

Companies	Initials	Positions	Genders	Years of experience	Functions	Level of education	Locations
NNPC	MNNPC	Managing Director	Male	25	Logistics and operations	Ph.D.	Lagos
TOTAL	MTOTAL	Manager	Female	15	Purchasing	Ph.D.	Benue
Rain Oil	MRainoil	Director	Female	20	Supply chain management	Ph.D.	Enugu

A A Rano	MAARano	Deputy Director	Male	18	Operations and supply chain	Ph.D.	Abuja

It was necessary to conduct the validation using the same companies but involving different participants to have a broader perspective, avoid research bias and improve validity. Using the same companies to verify the interview findings was a priority for the researcher because they are major oil and gas corporations, and the researcher could have access to the chosen managers more quickly.

5.5 Validation outcomes

The summary of validation to question 1 shown in Table 5-3. The outcomes confirm their understanding of performance improvement, which is compatible with our interview findings showing a good level of validity. The four respondents' views on question 1 are presented in appendix E.

Table 5-3: The summary of validation to question 1.

Summary	**Similarities**	**Difference**
It was confirmed that the selected respondents have good ideas about performance management and how to improve it. They identified steps such as aligning goals, increasing efficiency, and due process that organisations should adopt to improve their performance and supply chain process and meet market dynamics.	During the validation of the findings, it was noted that respondents' opinions were similar to study findings, Alignment of goals. Process management Policy making Transparency Consistency Reliability Continuous development Performance management	There was no difference in the validation ideas of the respondents. Therefore, respondents had a good understanding of performance management. See Appendix E for further details.

The summary of validation to question 2 can be found in Table 5-4. This question was designed to confirm their understanding of the enabler of supply chain collaboration leading to performance improvement. They further confirmed that the enablers of supply chain collaboration within their organisations are the same as those identified by this research findings. The four respondents' views on question 2 are presented below.

Table 5-4: The summary of validation to question 2.

Summary	**Similarities**	**Differences**

Question 2 was specifically designed to confirm the key elements that can enable supply chain collaboration to improve the performance of the oil and gas industry. It was confirmed that the identified enablers should be taken seriously and implemented to achieve adequate improvement. Also, the enablers identified can be used to manage information flow effectively, enhance the relationships among the supply chain partners, and fulfil customer expectations. The respondents were also pleased with the quality and the pattern in which the study elements were generated.	Information Sharing Top management supports. Performance management Quality management Relationship management	There are no differences; instead, could have been expected that performance improvement should have come from quality, speed, dependability, flexibility, and cost. However, they are all captured in the elements of collaboration. See Appendix E for further details.

The validation summary of question 3 is reported in Table 5-5. This question was designed to confirm the inhibitors to supply chain collaboration leading to performance improvement in Nigeria's oil and gas sector. This study's identified elements were confirmed to be inhibiting factors if not carefully managed by an organisation. The four respondents' opinions on the question are presented below.

Table 5-5: The summary of findings validation to question 3.

Summary	**Similarities**	**Difference**
The question 3 was directed at understanding the critical inhibitors of supply chain collaboration leading to performance improvement in the oil and gas industry. The respondents confirmed the identified findings of the study and suggested that if inhibitors are properly managed well, in turn, be enablers that will facilitate performance improvement. In addition, the respondents confirmed that the identified inhibitors are currently the major challenge faced in the industry.	Covid-19, Poor leadership, lack of Finance, inadequate Teamwork, poor Infrastructure, Ineffective Relationship management.	There were not many differences; instead, they suggested of approach to be considered, which was identified in their organisation, such as "The possible inhibitors of performance improvement can be unrealistic expectations or under-used resources". Nevertheless, this was covered in the poor leadership as a bigger picture. See Appendix E for further details.

Table 5.6: The summary of findings validation to question 4.

Summary	**Similarities**	**Difference**
The question 4: This research question aims to provide significant insights into effective supply chain management practises by analysing various methodologies and their consequences. Supply chain management is crucial to the success of organisations in a variety of industries. Organisations continually strive to improve their supply chain strategy in order to remain competitive. The purpose of this question is to investigate alternate strategies used by businesses to improve supply chain performance.	Process Monitoring and Evaluation, Management of business structure, Training, and Good Planning.	There were no differences.

5.6 Research Model Development

This section presents the process for Model development which is a process that involves several sequences of operations. It is repetitive to ensure the model is completely derived, validated, tested, and built upon a system to meet the desired outcomes or fashion. Subsequent modification work may need to start by looking at the same components that constitute the original model. Proposing a model may be done for many reasons, a common one being that the existing model needs to be updated, is unsuitable for current challenges or needs help understanding the process (Foss, 1998).

The study of Creswell and Creswell (2003) identified several academic research models. However, domain model diagrams are employed for this current study to envision the relationships between diverse objects in a system. They provide an in-depth understanding of how the several components in a system work together and help identify potential areas of improvement. Domain model development for supply chain collaboration leading to performance improvement in the oil and gas sector in Nigeria is shown in Figure 4-5.

5.7 Model Validation

The bigger picture about model development is to understand that there must be a business reason for building a model, which could be making a unique change, improving a process of operation, or presenting a simpler way of doing business and eliminating waste and risk. Once the researcher identified the need for business performance improvement in the oil and gas industry in Nigeria, he decided to develop a model using the identified components from this study, particularly the enablers and inhibitors to supply chain collaboration leading to performance improvement in the oil and gas industry in Nigeria. These components imputed into the model are useful in showing the direction of what is needed to improve performance.

The model was developed with the understanding that supply chain collaboration required some essential elements which can lead to performance improvement (operational performance, financial performance, and non-financial performance). And it is expected that the enablers and inhibitors of supply chain collaboration can be effective managed by other strategies, it was suggested that other strategies should be employed which include monitoring and evaluation, business strategy, training, and good planning. This model is designed with unique feature different from existing models as it has indicated the other strategies to be employed if the main components failed to produce result and its always better for every business to have a safety net.

5.8 Procedures for model Validation

This section presents the validation process that examines the uncertainties and risks associated with the model and confirms how realistic or viable the model's components can solve the organisation's real-time challenge.

The model development considers the following: the procedure a business needs, the model design was simple to eliminate waste and effective management of risk, ensure that the developed research model is validated by supply chain management and operations experts of the oil and gas industry in Nigeria. The confirmation was to express the validity of the model components for implementation.

The timeframe for the validation of the model was three months (from June to September 2022). The validation questions were sent to selected respondents in the selected oil and gas companies in Nigeria, and the results were all returned and interpreted by the researcher. However, it was confirmed that respondents agreed with the findings and components of the model presented by the research. Table 5-6 below presents the selected managers, companies, years of experience, roles, and educational level of participants.

Table 5-6: The biography of Research Model Validation respondents

Companies	**Initials**	**Positions**	**Genders**	**Years of experience**	**Functions**	**Level of education**	**Locations**
NNPC	MNNPC	Manager	Male	13	Operations and supply chain	MSc	Edo
TOTAL	MTOTAL	Manager	Male	17	Logistics and supply chain	Ph.D.	Jos

5.9 Questions for model Validation

These predetermined questions were employed for the validation of the model. The questions were designed to seek confirmation of the expectations from the industry and whether the model is capable of providing direction for performance improvement in the oil and gas industry.

Q1: Can you confirm how this model can lead to performance improvement in the oil and gas supply chain?

Q2: Are the model's identified elements capable of any organisational performance improvement of the oil and gas supply chain?

5.10 Model Validation Transcribes

This section presents the summary of the validation outcomes per question, observing similarities and differences shown in Table 5-7 and Table 5-8 and for details, see appendix .

This question was developed to confirm this study model, which contains key elements identified as enablers and inhibitors to supply chain collaboration. It was suggested that implementing those elements can improve supply chain performance in the oil and gas sector. It is important to note that Nigeria's oil and gas supply chain is a complex sector that requires a viable and functional operating system. This model is transparent and clear to provide the flow of what collaboration can achieve and classify the main levels of performance, which could be operational, financial, and non-financial.

The model outlines other key strategies to facilitate effective performance improvements, such as process monitoring and evaluation, business strategy, training, and good planning. The model presents a unique dimension of flow and structure capable of providing the necessary support to supply chain performance.

Table 5-7: Summary of Respondent Views on Model Validation Question 1

Summary of model leading to performance improvement	**Similarities in the validation process**	**Differences**
- The model presented the understanding of supply chain collaboration by identifying the adoption process, enablers, and inhibitors. It shows that if effectively managed can lead to performance improvement. - It presents other strategies to be employed in case of collaboration fails and can lead to performance improvement - Effective performance systems should consider operational performance, financial performance, and non-financial performance, which all plots together can result in an effective supply chain system in the oil and gas industry.	- Respondents agreed with the model as performance improvement can be achieved through the captured enablers and inhibitors of the collaborative supply chain. - Agreed with other strategies identified to be employed - Confirmed that supply chain collaboration ensures an enhancement in operational, financial, and non-financial performance improvement in the supply chain, which is important in the effective supply chain system.	-The difference suggested that the model would be general to improve overall business performance by identifying the key contributors to business economic losses. For example, operations performance engineers or industrial engineers use c down on the highest (top 20%) contributors of losses, breakdowns, inefficiencies, and outputs.

The summary of the participants for question 2 is presented in Table 5-8 outlining the similarities and differences below and more detailed in the appendix F. The question was designed and sent to participants via a google form mainly to validate the proposed model for this study, which is

believed to be useful in improving supply chain performance in Nigeria's oil and gas industry. The respondents confirmed that the model components captured factors that could enable and inhibit organisational performance. Therefore, it is capable of delivering the intended outcomes.

Table 5-8: Summary of Respondent Views on Model Validation Question 2

Summary of the key elements in the model capable organisational improvement	**Similarities in the validation process**	**Differences**
The key elements and understanding of the model are that: Supply Chain Collaboration led Performance Improvement = Effective Supply Chain. Or Other Strategies led to Performance Improvement = Effective Supply Chain	Respondents were given three months to try on the factors identified in the model. They agreed that the components could deliver the required improvement, and few suggested that identified inhibitors should be worked upon to realise the intended performance improvement.	One respondent agreed with the model's components and added that "Analysis of variable data, employing correct leadership elements to drive improvement in all facets of operations including managing quality, optimising resources such as talent (people), and closing the loop with planning, checking processes, and acting on needs to be adjusted (PDCA Model)".

5.11 Chapter summary

The chapter presents the validation summarises of the interview findings' outcome from the industry practitioners mentioned above. The respondents validated that the identified elements of the supply chain collaboration can provide an effective performance system in the Nigerian oil and gas industry if they are adequately implemented. Recurring from chapter 5, the said factors of supply chain collaboration leading to performance improvement were relayed back to the same interviewees to validate if the interview findings were indeed their thoughts and capable of boosting the industry's performance. It was suggestive that when properly implemented, the identified elements of supply chain collaboration can improve the industry's operational performance, financial performance, and non-financial performance (see Table 4-9).

The chapter summarises the key interview findings and the findings were based on the key patterns identified through the thematic process. The elements identified were then used for the model development which shows how enablers and inhibitors can be managed to improve performance in the oil and gas industry, Nigeria. The finding was validated by company managers who confirm the suitability of the identified components and then other strategies in the model were meant to support the process to achieve effective performance.

Furthermore, it was evident from the validation that the model is designed with components capable and simple enough to deliver performance improvement in the oil and gas supply chain.

The model uniquely provides that other strategies could be introduced to manage both enablers and inhibitors of supply chain collaboration leading to performance improvement. It also provides other strategies to be employed if collaboration fails, such as process monitoring and evaluation, business strategy, training, and good planning. The model's effective application of the identified factors should lead to performance improvement in Nigeria's oil and gas industry.

The next chapter discusses the study's findings supported by the supply chain management theories and the literature review outcome.

Chapter 6 : Research Discussion

6.1 Introduction

This chapter discusses the main research findings based on the data gathered from industrial practitioners and the literature with a focus on supply chain collaboration. This helps to explore supply chain collaboration from both organisational and theoretical perspectives, and support the researcher to triangulate among interview, literature and supply chain theories justifying the key elements in supply chain collaboration such as trust, network, communication, information sharing, goal congruence, infrastructure, finance, and environmental factors.

The research was based on the researcher's interest in understanding the effect of effective supply chain collaboration on performance improvement in Nigeria's oil and gas industry. The adoption of supply chain collaboration was aimed at performance improvement, which is implemented by the top management to provide enabling support for the effective operation of the sector in terms of performance improvement. Consequently, the key goals of this research are to examine the adoption of collaborative supply chain in the oil and gas in Nigeria and to explore the possible ways for performance improvement. The research assesses the level of collaboration adopted and identifies enablers and inhibitors for performance improvement in the sector (Hudnurkar et al., 2014).

In Particular, this research was accomplished by addressing the following research questions.

Question 1. How can supply chain collaboration improve performance in the oil and gas industry?

Question 2. What are the enablers of supply chain collaboration leading performance improvement in the oil and gas industry?

Question 3. What are the inhibitors of supply chain performance in the oil and gas industry?

Question 4. What are the key strategies utilised to enhance supply chain performance?

This research is one of the pioneers in breaking down supply chain collaboration into key components that are essential to enable performance improvement in oil & gas industry. These components are: alignment of goals, teamwork, decision Making, performance management, relationship management, timeliness and order management, quality management, finance, process monitoring and evaluation, management of business strategy, training and development, Infrastructure, good planning, Covid-19, infrastructural development, and poor leadership.

6.2 Discussion of question 1

The oil and gas industry in Nigeria deserve a better performance that will enable the effective flow of its resources as it is critical for the survival of the nation economy, export, and job creation. The key considerations for performance improvement in the oil and gas industry should focus on expanding supply chain visibility, developing a good relationship with suppliers, developing robust supply chain processes, and implementing supply chain key performance indicators and seeking experts' knowledge on how to better service delivery.

The adoption of collaborative effort in the supply chain was purposefully implemented to improve operation, productivity, quality, and performance (Uzochukwu & Ossai, 2016). Additionally, the intended benefits of adopting supply chain collaboration are evident in the consistent and functional operation of the sector. The oil and gas industry activities are managed by the host company and the government of Nigeria in terms of policy development, regulation, and supervision of its activities. National oil and gas are facing many transformations; however, there are notable enablers and inhibitors that this study examines. This is significant as the sector contributes immensely to the nation's development and employment export earnings. Therefore, the essence of this study is to identify the key enablers and inhibitors as it solves performance challenges and presents the happenings.

An organisation can adopt a strategy or approach, but if it is not managed correctly, it could work against its performance; therefore, it is important to carefully implement its policies with the aim of meeting the targeted result. Nigeria's oil and gas is a complex sector which requires careful attention from company managers and government officials responsible for policy making. By ensuring the alignment of goals, teamwork, and performance management as important elements to effective supply chain collaboration to achieve efficient performance of the sector.

6.3 Discussion of question 2

This study has significance to companies' behaviour as it is affected by the external resources acquired. These emphasise that oil and gas companies in Nigeria should create strong relationships with their partners, effective time management, quality control, infrastructural development, and effective decision-making to control financial flow. These are critical areas that enable performance improvement in the oil and gas sector, and they are directly connected to the resources

which is wise to state that the oil and gas supply chain in Nigeria is controlled by the government and the suppliers at external level. Presently, despite Nigeria been one of the largest exporters of crude oil in Africa, still the finished petrol products consumed in Nigeria are imported from foreign nations. This is partly due to the non-functional refineries in the country and has established more reasons for supply chain collaboration by creating good relationship with supplying nations such as Netherlands, Belgium, India, Norway, and United Arab Emirates and have called for huge infrastructural development in the country. To ensure effective flow of the petrol product in the country decision on the quantity and quality to be ordered must be timely and there must be enough finance to enable the transaction.

This position was established in the literature by Elisha (2020), stated that a non-functional refinery is due to a lack of maintenance culture, which in turn inhibits optimal performance of the supply chain of oil and gas companies in Nigeria, impacting on availability, and flows. The interviewee endorsed this point that the main underlying element attributed to lack of infrastructural development that inhibits adequate supply chain flow and results in underperformance (Femi, 7th September 2021). As the over dependence continues Nigeria imported 12.3 million metric tons of petrol in the first seven months of 2022, which sum to 202.9 million metric tons since 2015 and it is impacting on cost which there is need to control resources.

The application of resource dependence theory is to lay a strategy for effective management to achieve performance management. It is important to note that performance management can be actualised through efficient management of quality, speed, dependability, flexibility, and cost which are largely dependent on an organisation managing its processes.

Resource dependence theory is one of the most known theories that describe an organisation. A resource dependence theory presents that the goal of an organisation is to minimise its dependence on other organisations for scarce resources in its environment (Pfeffer, 1987). The key ideas behind this theory are to understand that scarce resources should be effectively utilised and minimise over-dependence on others. Scarce resources could be raw materials, staff, finances, and machinery needed for functional operation. It is only possible for organisations to operate by sourcing from one another effectively; therefore, this implies that an organisation may depend on another for supplies but not wholly or over-dependent. The goal of resource-dependent theory seeks to lower or minimise over-dependence, resource utilisation and adequate flow of inputs.

The application of resource dependence theory to support argument of the study findings and serves as a lens or strategy to explore how crucial resources are to organisations. The extent to which organisations control the supply and availability of resources is vital, and it is believed that it can be actualised through effective collaboration revealed in the literature. For example, collaboration promotes good planning, information sharing among parties, effective resource flow, and a good relationship between partners.

Normally, the oil and gas supply in Nigeria is controlled by the government and the suppliers and essential to state that the present finished products of oil and gas consumed in Nigeria are imported. This is partly due to the non-functional refinery in the country. This position was established in the literature by Elisha (2020) who stated that a non-functional refinery is due to a lack of maintenance culture, which inhibits the optimal supply chain of oil and gas companies' performance, availability, and flows. The interviewee agreed that poor infrastructure hinders supply chain movement and results in underperformance.

6.4 Discussion of question 3

This study has presented the impact of Covid-19 pandemic, infrastructural development as the greater challenge facing the companies and the country at large and as well as poor leadership.

These findings are relevant to organisational success as identifying them will help an organisation to plan by monitoring, controlling and manage the associated costs to operation and maintain its productivity. The high of uncertainty as a result of pandemic has great impact on cost, delay in product flow and most importantly this argument can be supported by transaction cost theory.

A transaction cost theory presents that an organisation seeks to minimise the costs of exchanging resources in the business environment and managing an organisation's day-to-day internal operational costs (Williamson, 2008a). Therefore, an organisation operates on guidelines within the transaction costs theory that focuses on cost reduction and maintaining good performance in its business activities. The practice of exchanging resources in a business environment encompasses financial flow, supply chain management, and marketing of the oil and gas company's products. The costs linked with the supply chain procedure of the products are negotiations to align goals, communication, monitoring, and transportation of the products.

Cutting operating costs will increase profits because these charges do not contribute value to the supply chain; any delay in a supply chain unit will influence lead times, quality, and overall profitability.

Likewise, additional costs acquired by an organisation are internal management and sometimes could be through a lack of information sharing within the supply chain. This implies that communication or information-sharing delays can negatively impact an organisation's supply chain and performance. For example, an organisation's inability to control its costs and untimely release of finances may impact the supply chain outcome because an organisation cannot effectively function without the key components. An organisation can cut costs by reducing the frequency of transactions, reducing system uncertainty, focusing on certain assets, rational decision-making, and looking out for new opportunities, as shown in Figure 2-14.

Furthermore, the study revealed that Covid-19 was another challenge faced by the supply chain in Nigeria's oil and gas sector, which inhibited collaboration. This was attributed to several factors, such as restricted movement, countries lockdown, border closure, social distancing, hand washing and frequent use of sanitisers. These have negatively impacted organisation performance due to a lack of strong relationships, and during the Covid-19 pandemic, it was challenging to control the use of resources. In addition, there was a delay in the supply chain systems affecting performance due to high uncertainties and interrupted distribution and delivery channels. Furthermore, there was a scarcity and shortage of oil and gas products, and optimisation was required to maintain performance. The interviewees confirmed that the Covid-19 pandemic had caused much damage to the effective supply chain systems, affected connectiveness with partners, and slowed down the entire performance activities in the industry. Therefore, it is important for organisations always to prioritise scarce resources and employ horizon scanning of the industry to know possible disruptions or changes in the market environment, enabling better forecasting and improving performance.

Consequently, looking at the suggestions revealed and confirmed by an interviewee, it is easier to prioritise scarce resources and adopt a collaborative supply chain to improve productivity and general performance.

This study revealed that supply chain performance could be improved. However, key factors contributing to delays in the chain should be addressed to minimise cost, such as infrastructural

development, quality management, effective financial allocation and monitoring and evaluation, to achieve organisational goals and objectives. These experiences reveal that costs can be minimised and, in turn, improve performance.

The deterioration of infrastructural systems, especially transportation, deters access and quick distribution, thereby increasing costs, inhibiting distribution, and slowing market performance. Consequently, the underdevelopment of infrastructure in the country inhibits supply chain performance and negatively impacts the collaborative effort of partners.

Therefore, based on the ideas from the study suggestions, supply chain collaboration aims to improve organisational performance. At the same time, transaction costs theory suggests that the best way for organisational performance improvement is through cost minimisation and effective allocation of finance, improved communication and information sharing among partners. This was equally confirmed by interviewees, saying that cost minimisation is one of the critical strategies that can be instrumental for supply chain performance improvement.

6.5 Discussion of Question 4

The study contributed that the oil and gas industries in Nigeria should integrate process monitoring, business strategy (inputs and outputs management), continuous training of staff and good planning in order to achieve the needed performance which are consideration in Organisation Systems Theory categorises or considers an organisation as a system. In its explanation, an organisation can be a closed or open system involving internal and external (Rice, 2013). This study treats an organisation as an open system that interacts with its environment considering the operation process taking inputs, transformation, and outputs into account. An organisation operates with resources such as equipment, natural materials, and employees, which are referred to as inputs. The inputs are transformed into finished products following a process that produces a result or outcome distributed to warehouses or markets. Every organisation values feedback as an essential element, and information sharing among organisations connects the inputs to output and effects changes where necessary (Hong et al., 2003). The management role is an open system which should be clear to manage to enable the flow of inputs such as raw material resources, employees, finances, and equipment. This area captured the aspect of the supply chain, and for adequate flow, there is a need for efficient monitoring of the transformation process as shown in Figure 6-1.

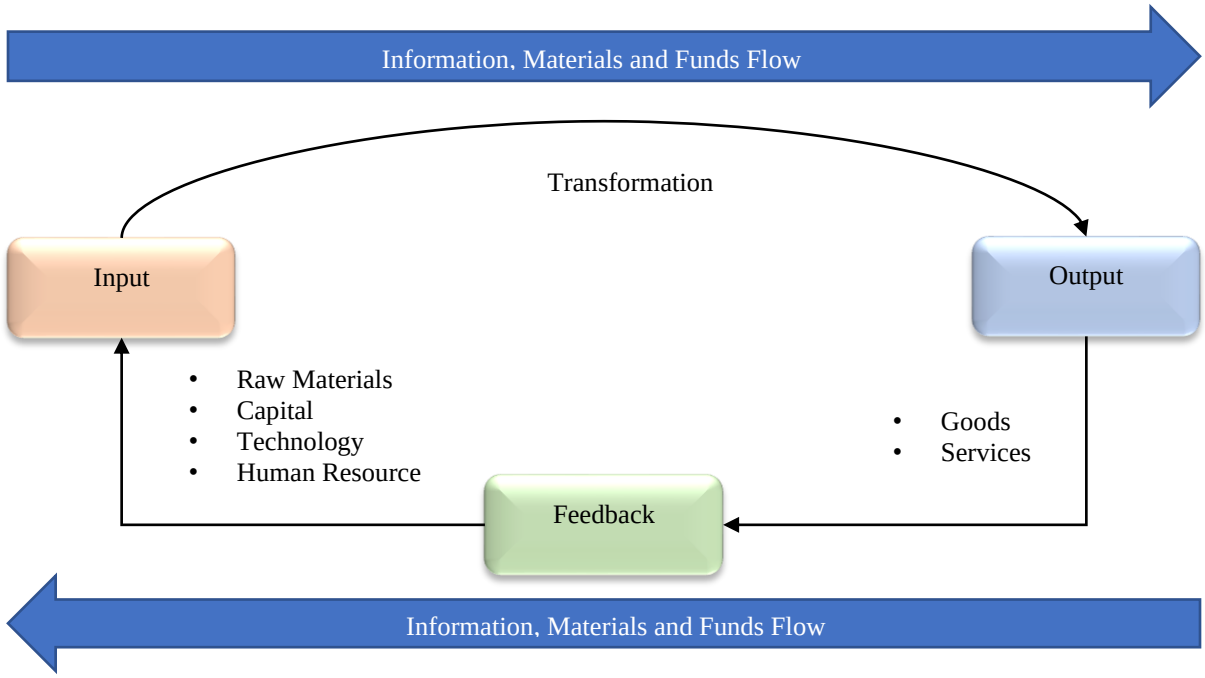

Figure 6-1: Organisation Systems Theory and Network Theory Framework

Source: Adopted from Hatch (2018)

The theory revealed that the supply chain collaboration operates as an open system that ensures that information is effectively shared among partners. In order to achieve long-lasting relationships, organisations are connected to themselves for a common goal and guided by process and procedure for performance sustainability.

Lack of information sharing can result in failure in planning and effective connectivity of the organisation. Consequently, information exchange is essential for supply chain collaboration to work efficiently. This consideration will enable performance improvement when adequate information flows within the system. The Figure 6-1 shows the organisation systems information flow.

Interviewees confirmed this position of information sharing as a critical function for performance during verification and validation exercise that information sharing fosters decision, planning, and management of organisation difficulties. It was confirmed that information sharing plays a significant role in an organisation's improvement, which is needed for the collaborative supply chain. Validation of information sharing as a finding for performance improvement is detailed in the appendix E, which shows that information sharing safeguards an organisation's operation.

6.6 Network Theory

Network theory is one of the adopted theories in the supply chain that illustrates the relationship between organisations. Håkansson and Snehota (1989) state that

"...some of the organisation's relationship with other organisations in the network constitute in themselves one of the most – if not the most – valuable resources that it possesses."

Similarly, an organisation network theory provides connectivity and deals with important factors that support organisations in planning and decision-making, as shown in Figure 2-16.

The theory supports organisations in achieving their competitive advantage by enabling adequate information and knowledge sharing within the business, which helps effective organisational decision-making (Gulati et al., 2000). In addition, the theory is appropriate in supply chain management as vital decisions are made on time, enabling effective resource flow (Monczka et al., 2015).

The main position of the theory is that it helps demand planning and effective allocation of resources because of the long-term relationship of organisations. However, organisations in a network theory provide the freedom to select from a set of suppliers, which the organisation can be sure of, to supply the required products for production (Monczka et al., 2015). On the other hand, the relationships among organisations are based on trust, which can lead to value-added for both parties and simplify supply strategy selections (R. Monczka, R. Trent, et al., 1998; R. M. Monczka et al., 1998).

Therefore, network theory is essential in the supply chain decision-making process and relates to this study as it explores supply chain collaboration in Nigeria's oil and gas industry. Figure 2-16 shows the connectivity key partners.

The application of network theory as a lens for this study revealed that the chain's lack of teamwork and inclusive decision-making process and the Covid-19 pandemic had caused a lot of changes in the supply chain, policymaking, planning and implementation of solid relationships. During the Covid-19 pandemic, industries and organisations were faced with uncertainty and a lack of continuity of existing programmes in the oil and gas industry in Nigeria. However, this position will result in more significant performance improvement if carefully managed. It was confirmed by interviewees saying that effort put into managing the Covid-19 pandemic era if

sustainably, can make the supply chain strong, if not stronger (See appendix D for details). Similarly, some of the teamwork-related factors are supported by the literature. For instance, Beulens et al. (2005), state that when there is a lack of teamwork or close relationships between parties and a lack of planning to facilitate decision-making, there are negative effects on the supply chain operations.

Another evidence from the literature is how improper planning can affect supply chain flows. Inadequacies in policy or improper planning are key barriers to effective monitoring and evaluation in an organisation. Every organisation operates with structures, and individuals have different roles and responsibilities. For any meaningful assessment, the methods employed are crucial and should consider the context and activities involved, the timeline and effective resource allocation, and the business strategy and planning for success (Colin Robson, 2016; Gray, 2013). Moreover, these expose more reasons why performance improvement has not been achieved fully in Nigeria's oil and gas industry due to infrastructural development, good planning, policy, and decision-making that will strengthen and foster trust and teamwork among partners.

Finally, it is evident that the supply chain performance improvement in Nigeria's oil and gas industry has not achieved its goals and objectives of making its products available to customers, easily accessible, and affordable always. These difficulties can stress poor information sharing in the system, lack of alignment, insecurity issues, unsatisfactory financial allocation, and entire business strategy management. These problems are prominent inside the oil and gas production supply chain due to over-dependence on suppliers and a lack of value-adding processes for sustainability. Therefore, this study's contribution to knowledge is that a highly dependent system is prone to failure and failures by delays in exchanges. In addition, insecure operations, such as transportation losses, were also discovered in this study, but they were partly caused by a lack of infrastructure and the Covid-19 pandemic's effects.

The existing literature only focused on the preliminary factors that affect the supply chain flow of oil and gas products without looking for ways to improve performance. However, the government can always employ more sophisticated and reliable monitoring and forecasting mechanisms to evaluate the market and observe all changes or event disruptions.

The supply chain of oil and gas industry operations monitoring, and supervision can be improved with the help of effective financial allocation, good planning, alignment of goals and teamwork.

Similarly, it is suggestive that the supply chain should be straightforward, avoiding complicated issues and risks. This will make transactions easier, create relationships, build trust, and promote teamwork. The main contributions of the study and the relevance of the applied theories are summarised in Table 6-1.

Table 6-1: Theoretical Contribution and Their Relevance to this Research

Theoretical Perspective	**Contributions**	**Relevance**
Resource dependence theory	This study helped organisations create strong connections with their partners, effective time management, quality control, infrastructural development, and effective decision-making to control cash flow since it shows that organisations' behaviour affects external resources.	The resource dependence theory justifies how organisations' behaviour is affected by the external resources they possess. Furthermore, it is suggested that organisations vary in how they negotiate with their external environment to obtain access to the resources they require for survival.
Transaction cost theory	This study outcome contributed to the organisation of the impact of Covid-19 during the pandemic era. Organisations faced regulations and government policies resulting in delays in suppliers and deliveries to customers. In addition, infrastructural development significantly impacts the organisation through transportation and communication and poor leadership to implement a better policy to support organisations for success.	Transaction cost theory suggests that the ideal is for an organisational structure to accomplish economic efficiency by reducing exchange costs. The theory states that every form of transaction makes up coordination costs such as monitoring, controlling, and managing the entire transaction.
Organisation systems theory	The notable contributions of the theory are that the oil and gas industries in Nigeria should integrate process monitoring and business strategy with an emphasis on the flow of inputs and outputs, encourages continuous training of employees and cultivate good planning to actualise effective performance. These are key components for a successful organisation which are considered in Organisation Systems Theory. An organisation works with resources such as equipment, natural materials, and employees, which are transformed into outputs.	Open systems theory is essential for organisations because it presents a framework that enables critical thinking about processes that occur in an organisation and equips them for any change that could impact the part of running an organisational activity. Open systems always watch out for the change process and adapt to shifting situations.

Network theory	The significant contribution of this theory covers almost all aspects of the supply chain that are identified to be related to oil and gas operations. The theory contributes the monitoring and supervision, which are crucial to improving financial flows within the system, facilitating good planning, aligning goals, and promoting teamwork. Also, it is suggested that the supply chain should be straightforward, preventing complex issues and risks. Implementing the theory by the organisation will make transactions easier by creating a good relationship that builds trust and promotes teamwork.	The relevance of the network theory is that it explains the relationships in which businesses, suppliers, customers, or buyers are involved and connected.

6.7 Chapter Summary

The main discussion of the key components of the study findings concentrates on the four study questions employed to support the conduct of the study throughout. Therefore, this chapter begins by presenting the findings, establishing what informs supply chain collaboration, and identifying the factors that can lead to performance management in Nigeria's oil and gas industry.

Four study questions were employed to help the researcher to arrive at the unique sixteen findings. The study findings are grouped into factors such as alignment of goals, teamwork, performance management, relationship management, timeliness and order management, quality management, finance, infrastructure, process monitoring and evaluation, business strategy management, decision making, training and development, good planning, Covid-19, infrastructure development, and poor leadership, enhanced the research's originality.

The identified component can lead to performance improvement when implemented, and the applied theories help increase collaboration. It helps managers and leaders encourage team participation as collaboration improves performance. Understanding components of the study findings and blend will increase objectivity and provide organisation leaders to make logically and scientifically proven changes more accurately than relying on personal judgment.

The next chapter presents a conclusion focusing on the study's reflection on the journey and its implications. The concluding chapter provides suggestions for oil and gas industries, supply chain collaboration and security, and contributions to teaching and researching supply chains in

Nigeria's oil and gas industry. Finally, this presents the list of references and appendixes which were utilised for the conduct of the study.

Chapter 7 : Conclusion

7.1 Introduction

This chapter summarises and presents the main ideas in the context of the thesis and sums up the argument of the critical findings of the research. The main reason behind this study focused on examining the adoption of supply chain collaboration, identifying enablers and inhibitors in the oil gas sector in Nigeria and how performance can be improved. In order to effectively manage the enablers of supply chain collaboration and achieve the performance improvement, it is important to logically mange costs associated in the supply chain operations in the oil and gas sector, promote networking among partners and create visible market channels, encourage clear communication of goals and objects. It is also important to put in place measures that will help prevent or identify potential issues that could impact negatively to the performance of supply chain in the oil and gas industry such as accurate budgeting, right reporting channels and management of uncertainties such as war, pandemic and change sudden changes in government policies. It reflects on the logic of enablers in the supply chain and identifies inhibitors and their effects to supply chain performance improvement.

The unique environment and requirements of the company will determine how to prioritise these variables. Here is a suggested sequence based on overall relevance and influence, though, and following it may assist an organisation adopt a step-by-step implementation strategy.

1. Alignment of Goal: For overall success, it is essential that all team members understand and support the organisation's objectives. It provides a unifying goal and course of action for everyone to follow.
2. Good planning: Clear objectives, strategies, and timetables are made possible by effective preparation. In order to attain desired results, it aids in determining priorities, allocating resources, and coordinating activities.
3. Collaborative relationship management: Promoting successful communication, cooperation, and problem-solving inside the team as well as with external stakeholders requires the development and maintenance of strong connections. It improves collaboration and overall output.
4. Quality management: Maintaining high standards in goods or services is crucial for ensuring customer satisfaction and preserving an organisation's good name.

5. Process monitoring, ongoing improvement, and achieving customer expectations are all part of it.
6. Performance management: Evaluating and overseeing team and individual performance helps to pinpoint advantages, resolve disadvantages, and offer constructive criticism for improvement. Accountability, inspiration, and production are encouraged.
7. Teamwork is essential for efficient issue resolution and resource allocation. These decisions should be supported by data analysis. It entails analysing possible risks and advantages while considering various viewpoints.
8. Timeliness and order management: Meeting deliverables, sustaining productivity, and preventing bottlenecks or delays are all facilitated by effectively managing timelines, deadlines, and job prioritisation.
9. Training and development: Investing in an employee's growth and development improves their talents, skills, and knowledge. Overall performance, flexibility, and employee happiness all improve.
10. Management of company strategy: Creating and putting into action a sound business plan promotes long-term success and a competitive edge. It entails researching market trends, picking out prospects, and allocating resources appropriately.
11. Finance: Managing financial resources efficiently is crucial for the organisation's long-term viability and profitability. This includes budgeting, cost management, and financial planning.
12. Monitoring and evaluating processes on a regular basis may assist to spot inefficiencies, cut down on waste, and boost production. It entails tracking key performance indicators and putting process optimisation techniques into action.
13. Infrastructure is crucial for a seamless workflow and effective resource use. It must be both physical and technical to support operations and encourage cooperation.
14. COVID-19: Considering the ongoing worldwide pandemic, businesses must prioritise health and safety precautions, make adjustments for remote work settings, and deal with the difficulties and interruptions brought on by COVID-19.
15. Infrastructure development: Depending on the organisation's growth objectives and future requirements, long-term infrastructure development efforts, such as enlarging facilities or updating technical systems, may be prioritised.

16. Poor leadership: While leadership is crucial, poor leadership negatively impacts all aspects of the organization. Addressing leadership issues should be a priority to ensure effective decision-making, communication, and overall organisational success.

It is also crucial to keep in mind that prioritising varies based on the particular conditions, sector, and organisational objectives. It's critical to frequently revaluate priorities and make adjustments as necessary.

7.2 Reflections on the Research Journey

The researcher acknowledges that this study is a personal learning experience and that it is valuable to reflect on it as someone who studies supply chain collaboration in Nigeria's oil and gas industry, which is the country's principal source of income and means of basic survival. The researcher was always hoping to see an efficient supply chain system where oil and gas from industry could be distributed swiftly, affordably, and without affecting the quality of its distribution to the market, but this rarely occurred.

This revealed that the oil and gas industry was dysfunctional and deserved further examination and inquiry out of personal interest and because of its national significance for the national revenue and importance to individual businesses and their continued existence.

The outcome of the literature revealed that there are limited publications on supply chain collaboration leading to performance improvement in the oil and gas industry. The enablers and inhibitors of supply chain collaboration in the oil and gas industry were missing from the literature review. In addition to this, there are no existing supply chain collaboration model for mitigating supply chain issues and improving performance in the oil and gas industry from the literature review. Table 2-1 further detailed that there is limited publication for supply chain publication in the Nigeria oil and gas industry leading to performance improvement. Therefore, the researcher considered this as a gap in the literature publication on supply chain collaboration and supply chain performance.

Furthermore, literature uncovered a gap in examining supply chain performance in Nigeria's oil and gas industry. In an influential journal by Amue and Ozuru (2014), in which they examine the three levels of integration of supply chain such as process integration, knowledge integration and information integration which are all geared towards performance improvement with specific focus on oil and gas industry in Nigeria. This information further strengthened the researcher's

interest and stimulated further inquiry into understanding impact of supply chain collaboration leading performance improvement in Nigeria's oil and gas industry more especially at the downstream.

Having reflected on the nature of the problems facing oil and gas in Nigeria, the researcher decided to utilise a qualitative method and interview the key actors of the oil and gas industry to gain better insight from their experiences. The interviewees were consistently interested and supportive of the study and indicated that the study was timely and valuable.

The transcription of oral interviews was slower and more time-consuming than the researcher had expected. However, the process provided the opportunity and discipline to contemplate more carefully and understand what the interviewees had said.

The researcher has realised that data collection, especially if done personally at distant and widely dispersed locations, and its management can be challenging. The writing stage was a unique experience the author enjoyed by clearly expressing thoughts, arguments, discussion, and conclusions.

7.3 Implications of the Study

By identifying sixteen elements of supply chain collaboration (enablers and inhibitors) that affect organisations' operations and performances, this research has produced some useful new provisions for understanding and developing supply chain collaboration models that contribute to supply chain performance improvement in the oil and gas industry.

7.4 Implications for Research

Applying several theoretical lenses to programme performance was also helpful. The methodological approach used in this thesis to examine the adoption of supply chain collaboration for performance improvement in the oil and gas industry in the Nigerian context was a novel contribution on its own. The existing literature on studies of similar organisations uses a single view to study a narrow section of the whole organisation. This study examined the four largest oil and gas companies interviewed managers and employees that were involved in the policymaking rather than focusing small and one company which may be difficult to generalise the findings and was able to identify enablers and inhibitors of supply chain performance.

This study presents a further novel contribution by creating a model that provides a more transparent representation of the supply chain collaboration in the oil and gas sector and identifies

linkages between the components. It has shown that for an organisation to achieve performance improvement, it requires teamwork, clear communication and develop its infrastructure etc which are elements of the study findings.

Anything that hinders the progress or performance of an organisation or research output is considered a limitation. This includes the time, finances, materials, size, etc. Every study has limitations, and the perceived limitations to this study could be pragmatic issues such as the time allocated to conduct the entire doctoral research. Furthermore, it might not be practical to undertake longitudinal research or to interview every supply chain participant in the Nigerian oil and gas supply chain. Generally, Nigeria is a vast and populous country for data collection, and it is impossible to collect data from individual states considering the duration of the doctoral research. Therefore, the researcher chooses six states across the country to effectively represent and generalise findings.

One of the study's strengths is that it draws on the opinions of 30 interviewees for data collection, four interviewees for research findings validation and two for study model validation, which were gathered from a large purposive sample and analysed using a thematic approach. In addition, the number of participants enabled the author to understand the subject matter in-depth.

7.5 Implication for Teaching

The study reveals that the research context is important for management decision-making. Therefore, students should be taught using crucial studies to express how inhibitors can affect organisational performance. Moreover, teaching should include several viewpoints that demonstrate how to apply academic theories into practice. For example, the application of a system theory is to examine complex organisational factors that work together for the benefit of the organisation as whole. Transaction cost theory seeks to examine costs associated with the organisation operations and minimising them create an opportunity for maximising profit. The application of resource dependence theory guide an organisation on factors that could impact negatively to its performance particularly dealings with external resources, while the application of network theory is to promote teamwork which are the needed components for supply chain collaboration leading performance improvement as such the supply chain of oil and gas industry in Nigeria is a complex organisation that requires teamwork, costs reduction and prioritise resources in order to be successful. Students should be able to use multiple lenses to examine

supply chain collaboration leading to performance improvement while considering the views of various actors, such as managers and employees. They should also have access to practical studies on industrial-related issues, effective management, and the identification of issues affecting the success of a programme. This study could be considered as case study for both undergraduate and postgraduate students.

7.6 Research Contribution

Nigerian Oil and Gas industry supply chain collaboration is examined in this study, with a focus on strategies to improve performance. Overall, this study adds to the theoretical and practical understanding of supply chain collaboration in the Nigerian oil and gas industry by providing insightful information and practical suggestions for enhancing performance in this crucial industry. This study primary research contribution includes:

- **Empirical Insights**: This study sheds light on current possibilities and difficulties in the Nigerian oil and gas industry by offering empirical insights about the state of supply chain collaboration in that sector for performance improvement.
- **Performance Improvement Model**: The research creates a practical model for enhancing supply chain performance through collaboration, providing a systematic method that can be utilised in the industry.
- **Contextual Relevance**: By concentrating on the Nigerian oil and gas sector, the study acknowledges the special difficulties and dynamics of this industry, making its conclusions particularly applicable to stakeholders operating in comparable resource-intensive industries around the world.
- **Managerial Implications**: The research provides industrial expertise, businesses, and policymakers with effective strategies on how to improve collaboration between the supply chains, which can boost productivity and operational efficiency, cut costs, and improve competitiveness.
- **Academic Contribution**: By offering a performance improvement model that can be used as a reference in future research projects and educational initiatives, this study contributes to the academic debate on supply chain collaboration.

7.6.1 *Novel Contribution*

The study revealed a good relationship between the literature and the primary data, as sixteen important parts of the findings were identified during the thematic process, which include

alignment of goals, teamwork, decision-making, performance management, collaborative relationship management, timeliness and order management, quality management, finance, process monitoring and evaluation, management of business strategy, training and development, infrastructure, and good planning. These parts were found to be similar and consistent with the existing literature. The COVID-19 pandemic, infrastructural development, and poor leadership were novel ideas as barriers to supply chain collaboration, and the development of or highlighting other strategies that have been researched and added to the body of knowledge was a unique contribution that has not in the existing models.

It is crucial to remember that uniqueness is typically evaluated in the context of a particular industry or area of expertise. The primary topic of this study is supply chain collaboration as a crucial element of performance improvement in the oil and gas sector. As a result, something that may be original in one discipline but not in another may not be unique in that field. Furthermore, novelty alone does not guarantee the significance or influence of study results. Research's relevance is based on more than simply its uniqueness; it also involves its contribution to knowledge, its applicability in daily life, and its potential consequences on further studies or applications, of which both aspects are true and reflected in this study.

7.7 Advice for the Oil and Gas Companies in Nigeria

These research findings may serve as a guideline to the oil and gas in Nigeria in its effort to improve effective supply chain flows of these crucial products nationwide. In order to realise effective supply chain performance of oil and gas in the country, the oil and gas companies must adopt all the sixteen elements of supply chain collaboration used for model development to improve the industry's overall performance. The key steps to help organisation adopt or manage the enablers successfully is by its important to pay attention to detail rather than surface approach, be ready to change, empower employee’s communication, promote vertical integration, and ensure active leadership.

7.8 Limitation and Further Research

It is hoped that this research provides insight into the factors enabling and inhibiting the supply chain performance in Nigeria's oil and gas industry. However, the limitations identified have provided a new direction for future studies.

This study has examined the adoption of supply chain collaboration leading to performance improvement. The information was based on the views of managers and employees in the oil and gas companies and who were also policymakers in the various companies interviewed. This highlights the need for future studies to extensively examine challenges in the oil and gas sector in Nigeria as it is very crucial sector that has much impact on the development of the nation as it accounts for 85% of the nation export, job opportunities, and 90% of the nation's income is generated from oil.

Due to organisational resource constraint, it may not be possible to implement all the sixteen findings of the study at once therefore, step by step priority of the findings was suggested which can be easy for implementation.

It is suggested that future research should focused on quantifying the relationship between supply chain collaboration factors and performance indicators.

Further researchers should employ a quantitative and/or comparative techniques to establish the validity of the developed model.

Further research should adopt case-based approach in examining how supply chain performance can be improved.

The study uses a "cross-sectional" case study approach to analyse how supply chain collaboration was adopted in Nigeria's oil and gas industry, which led to performance improvement. It is important to note that it may be novel for future researchers to conduct "longitudinal research" via long-term observation of supply chain performance in the oil and gas industry to prove the validity of these findings and to determine if there are any potential variances in the outcome.

Finally, it may be significant for future researchers to conduct quantitative research to test variables identified in this study especially the enabling factors of supply chain collaboration leading to performance improvement in the oil and gas sector. This will determine whether the outcomes would be the same as this current study and further authenticate the identified sixteen findings of this study for the generalisation of the ideas.

7.9 Recommendation

This thesis is a demonstration of my research journey. It has captured and developed a new model, which provides an understanding of the supply chain performance improvement in Nigeria's oil and gas industry.

This study exposes some details that had not been observed by previous researchers in the context of Nigerian performance improvement in the oil and gas industry or which were overlooked by researchers possibly due to their complexity. Thus, this study contributes toward filling a gap of understanding into the reasons why effective performance has not been achieved in the supply chain and its intended objectives of efficient flow in Nigeria.

The work has been an enjoyable study of a significant real-world problem which had not been previously studied and has generated conclusions that it is hoped are of value and interest to stakeholders in the oil and gas industry and future researchers in this area and related topics.

To further knowledge in this field, recommendations are provided for future studies, such as use of quantitative research method, comparative or mixed-method research, to further examine supply chain problems in the Nigerian oil and gas sector and related themes using case studies.

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Appendix A Literature Review Search Criteria

Keywords	**Database**	**Literature Search Criteria**							**Number of Articles**
		Subject Areas	Document Type	Publication stage	Keywords	Country/Territory	Source Type	Language	
Supply Chain Management Accessed 05/07/2022	Scopus	Engineering, Business, Management and Accounting	Articles, Books, Books reviews, Peer Reviews	Final	Supply Chain Management, Supply Chains, Supply Chain		Journals, Book Series, Books	English	10,919
	Judgement	For the purpose of understanding the true nature of SCM, the researcher considered the articles with high citations (300 and above) and relevant to the area of study							281
		After a critical review and reading of the 281 articles, 100 articles were considered at the end							100
Supply Chain Management And Oil and Gas Industry Accessed 05/07/2022	Scopus	Engineering Energy Business, Management and Accounting	Articles, Books, Books reviews, Peer Reviews	Final	Supply Chain Management, Supply Chains, Oil and Gas, Gases, Petroleum Industry, Gas Industry, Oil and Gas Industry		Journals, Book Series, Books	English	75
	Judgement	All the documents were reviewed and the relevant ones were selected. Furthermore, few articles were selected based on their relevance to the research study							47
"Supply Chain Collaboration" OR "Collaborative Supply Chain" Accessed 06/07/2022	Scopus	Engineering, Business, Management and Accounting,	Articles, Books, Books reviews, Peer Reviews	Final	Supply Chain Management, Supply Chains, Supply Chain Collaboration, Collaborative Supply Chains, Supply Chain		Journals, Book Series, Books	English	490
	Judgement	All the 490 articles were reviewed based on their titles, abstracts, keywords, and conclusions. In the end, 195 articles were selected which are relevant to the research area of study							195

Supply Chain Collaboration OR Collaborative Supply Chain AND Oil and Gas Industry Accessed 06/07/2022	Scopus								51
Supply Chain Collaboration OR Collaborative Supply Chain AND Oil and Gas Industry Accessed 06/07/2022	Judgement	After carefully examining the whole 51 documents by considering their Titles, abstracts, keywords and concluding sections							
"Supply Chain Performance" Accessed 06/07/2022	Scopus	Engineering, Business, Management and Accounting,	Articles, Books, Books reviews, Peer Reviews	Final	Supply chain performance, Supply Chain Management		Journals, Book Series, Books	English	1,441
	Judgement	For the purpose of understanding the true nature of supply chain performance, the researcher considered the articles with high citations (100 and above) and relevant to the area of study							143
"Supply Chain Performance" AND Oil and Gas Industry Accessed 07/07/2022									18
Supply chain uncertainty AND Oil and Gas Industry Accessed on 07/07/2022	Scopus								65
	Judgement	After carefully examining the whole 65 documents by considering their Titles, abstracts, keywords and concluding sections, 30 articles were finally selected							30
"SCM" AND "SC" AND "SCC" AND	Scopus								1
	Judgement								

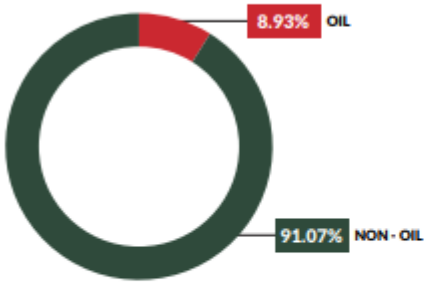
"SCP" AND "OGI" AND "SCU"									
"SCM" AND "SC" AND "SCC" AND "SCP" AND "OGI"	Scopus								6
	Judgement								4
Supply chain management AND Supply chain Performance AND Supply chain collaboration AND oil and gas industry									0
Supply chain management AND Supply chain Performance AND Supply chain collaboration AND Supply Chain Uncertainty	Scopus								
	Judgement								0
Supply chain management AND Supply chain Performance AND Supply chain collaboration AND Organisational Uncertainty	Scopus								0
"Supply Chain Management"	OnePetrol								410
	Judgement	The number of the article was limited to 10 articles after selecting title search only							10
"Supply chain"	OnePetrol								2341
	Judgement	These search criteria was carried out because the above keyword resulted to very few articles. The number of articles was limited to 68 articles after selecting title search only. 15 articles were journals while 53 articles were conference proceedings articles							
"Supply Chain Management" AND "Supply Chain" AND Oil and Gas Industry									0

Supply Chain Management AND Supply Chain AND Oil and Gas Industry									0
Nigeria AND Supply chain	OnePetrol								5
	Judgement	2 papers were selected after reading and reviewing							2
Nigeria Supply Chain	OnePetrol								544
	Judgement	The search outcome was further limited to conference proceedings papers (494) because the journals papers (50) did not contain the keywords in the titles which makes it not essential to the study							494
		For the purpose of understanding the supply chain system in the Nigerian oil and gas industry, the above judgement articles were critically reviewed and the articles that discuss only the Nigerian oil and gas context with a focus on the supply chain and other irrelevant articles were removed which ended up to 50 articles.							50

Appendix B Research Location and Companies

The research location is Nigeria because it is a country that represents a typical developing economy that relies heavily on oil and gas for survival, as shown in Figure 7-1 and supported by Kale (2020); Kasirim (2021). The researcher also recognised the importance of the oil and gas supply chain programme for the economy. Therefore, the location was chosen because the researcher strongly believes in having access to defendants or oil and gas industry participants to obtain the needed information for the study process. Furthermore, the country suited the purpose of robust and reliable research into adopting supply chain collaboration to improve industry performance. Nigeria may have an accepted application of supply chain collaboration in some sectors, but the oil and gas industry needs a better experience of success in supply chain collaboration. Figure 7-1 show the impact of oil and gas industry to National GDP as compared to other oil sectors. Also, this figure analysis the quarterly oil GDP between 2018 to 2020 and the price of oil sold per barrel between 2017 to 2020.

CONTRIBUTION OF OIL AND NON-OIL SECTORS



CONTRIBUTION OF OIL AND NON-OIL SECTORS

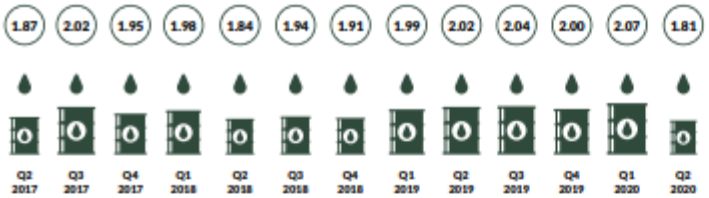
NON-OIL GDP

Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020
92.94	90.78	91.02	90.23	92.68	90.50	91.07

OIL GDP

Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020
7.06	9.22	8.98	9.77	7.32	9.50	8.93

OIL PRODUCTION (MBPD)



CONTRIBUTION TO REAL GDP Q2 2020 (%)

SHARE OF AGRICULTURE, INDUSTRY AND SERVICES

SHARE OF OIL AND NON-OIL SECTORS

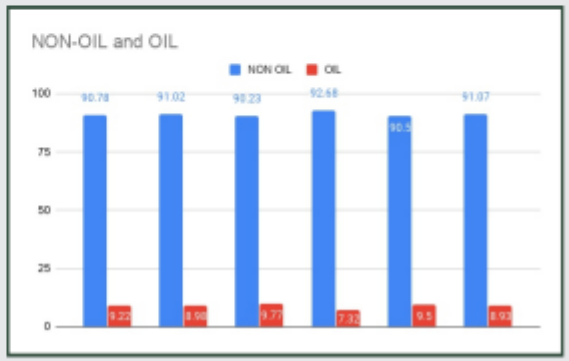


Figure 7-1: The Impact of the Oil and Gas Industry on Nigeria's GDP
Source: Kale (2020); Kasirim (2021)

Furthermore, the author conducted data collection in Nigeria's oil and gas industry with a few selected oil and gas companies to identify how supply chain collaboration leads to performance improvement. The data collection outcome allows the author of this study to develop a model for providing an effective supply chain system in the Nigerian oil and gas industry.

Companies Backgrounds

The web search conducted by the researcher indicated that there are 101 oil and gas companies in Nigeria (Joseph, 2022). Four notable companies in the country were selected as the researcher underwent purposive sampling for the data collection. These companies have several oil and gas outlets and operate across the three sectors (upstream, mainstream, and downstream) of Nigeria's oil and gas industry. Above all, the selected companies are well vase in the supply chain activities, which effectively coordinates the movement of oil and gas products from one location to another. The capabilities and backgrounds of the selected four companies are further discussed below.

Nigerian National Petroleum Corporation

The Nigerian National Petroleum Corporation (NNPC) is owned by the government of the Federal Republic of Nigeria. It is one of Nigeria's most giant oil corporations, established in 1977 and the primary asset holder in the Nigerian oil and gas industry (Bayode & Joseph, 2014; Osuala, 2013). Despite its primary exploration and operational endeavours', the company has been involved in refining, product logistics, transportation and supply chain, petrochemicals, and marketing of refined products across the nation. As a result, it has contributed immensely to revenue generation and development, such as human capital, scholarships, job opportunities and university infrastructure. Figure below shows the operations and activities of Nigeria National Petroleum Corporation.

Nigerian National Petroleum Corporation

*Source: (*NNPC, 2022*;* Nnpc, 2019a, 2019b*)*

Nigerian National Petroleum Corporation has been managed as a joint venture between the Nigerian federal government and several foreign multinational corporations, which include Royal Dutch Shell, Agip, ExxonMobil, TotalEnergies, Chevron, and Texaco (now merged with Chevron) by law. This is possible because, in collaboration with these companies, the Nigerian government conducts petroleum exploration and production (Nwokeji, 2007). This has clearly shown the importance of collaboration to business or industry operations. The assets and oil blocs are managed and supervised by the Federal Ministry of Petroleum and Finance. Its assets' worth is estimated to be $60 billion (about N25.27 trillion), contributing 76% of federal government revenue and 40% of the country's GDP (Bayode & Joseph, 2014; NNPC, 2022; Nnpc, 2019a, 2019b; Osuala, 2013). Furthermore, Table 1-1 detailed the milestones of Nigerian national petroleum corporation and its functionalities.

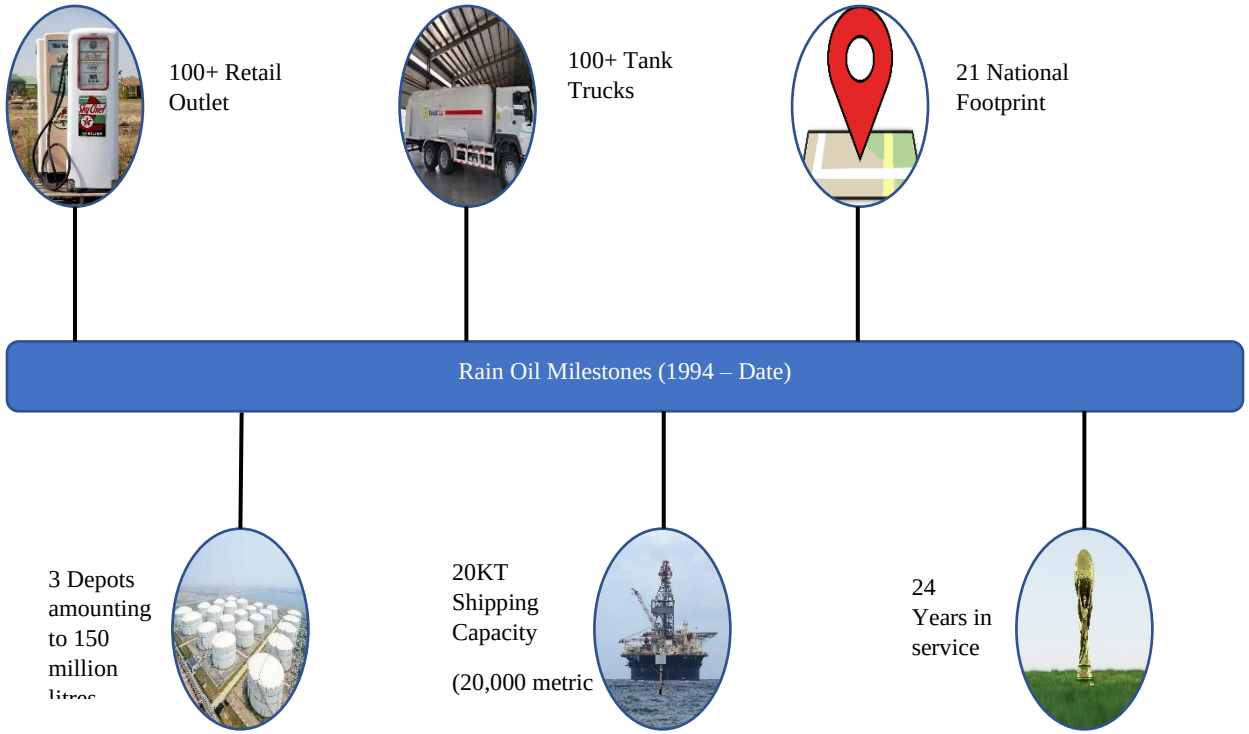
Table 1-1: Nigerian National Petroleum Corporation Milestone

Nigerian National Petroleum Corporation	
Founded	1977 (44 years of Experience)
Company's Products	Crude Oil, Gas, Petroleum Products, Petrochemicals, Liquid Hydrocarbon and Sustainable Energy
Industry	Oil and Gas Industry
Oil and Gas Sectors	Upstream, Mainstream and Downstream

Type	State-Owned Company
Headquarter	Abuja, Nigeria
Assets' Worth	N 25.27 trillion
GDP Contribution	40% of the country's GDP
Employee Capacity	More Than 7000 Workforce
The Largest Africa Oil Producer and Supplier	

Rainoil

Rainoil Limited is a well-known integrated downstream company in Nigeria's oil and gas industry. The Rainoil Group of companies operates throughout the downstream value chain. Retail sales are among them, in addition to bulk storage, logistics and shipping, haulage and distribution (Rainoil Web; Rainoil Web). Petrol (PMS), Diesel (AGO), Kerosene (DPK), Liquefied Petroleum Gas (LPG), and naphtha are among Rainoil's principal products. Rainoil Limited was founded in 1994 and began marketing petroleum products in 1997. Figure below highlight the milestone and activities of Rain oil from 1994 to date.



Rainoil Milestone
Source: Rainoil Web

A. A. Rano

The company first opened for business in 1994 and was incorporated in 2002. AA RANO is a significant force in the Nigerian oil industry as one of the country's largest downstream oil trading firms. More than 600 fleets operated by the corporation travel the highways of Nigeria in the transportation industry (Mohammed, 2018). AA RANO has more than 120 oil and gas filling stations in Nigeria. Over three thousand to four thousand jobs have been made available to Nigerians by the company. The company's primary focus is oil and lubricants, but they also dabble in automotive maintenance, liquid petroleum gas (used for cooking), retail, transportation, and logistics (majorwavesen, 2019).

Table 1-2: A A Rano Milestone

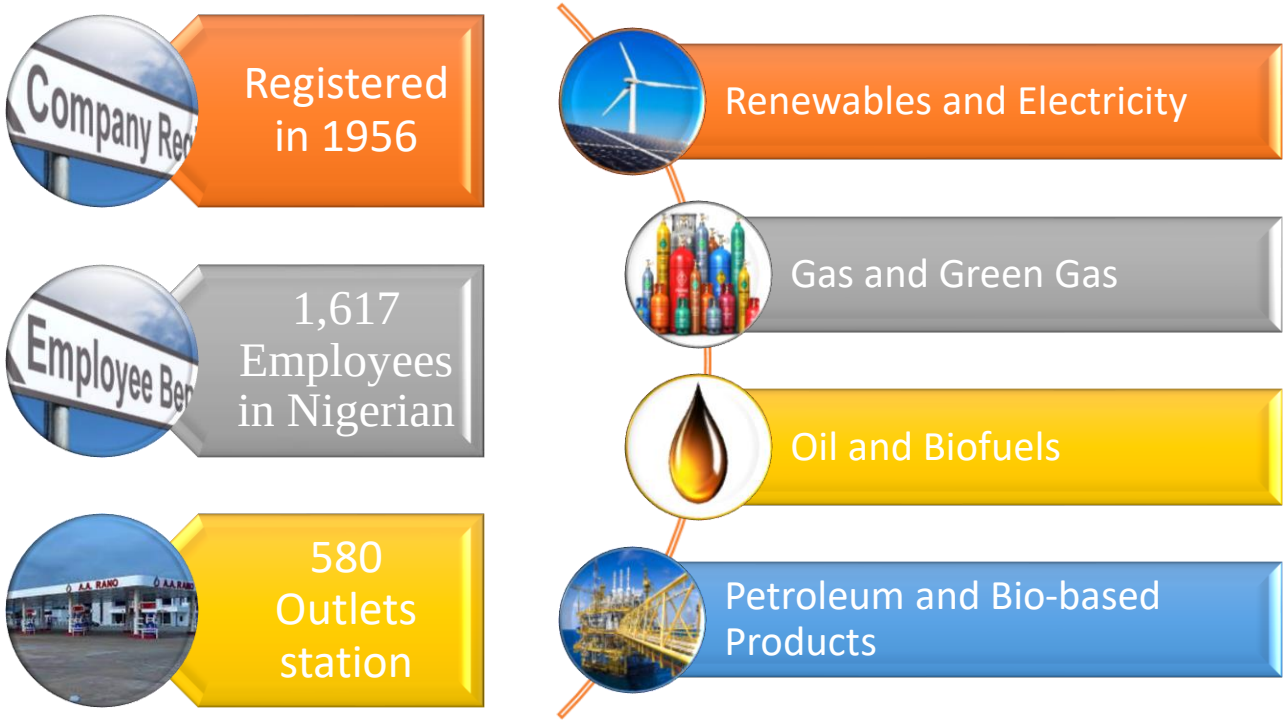
A. A. Rano	
Founded	1994 and was incorporated in 2002
Company's Products	Petroleum Products, oil and gas products logistics and transportation, more than 120 oil and gas filling stations, oil and gas storage, and Petrochemicals.
Industry	Oil and Gas Industry
Oil and Gas Sectors	Downstream
Type	State-Owned Company
Headquarter	Abuja, Nigeria
Assets' Worth	$2 billion
Employee Capacity	More Than 3000 Workforce

Total Nigeria

Total Nigeria Plc, now called TotalEnergies Marketing Nigeria Plc, is a marketing and services.

subsidiary of Total, a global integrated oil and gas business and one of the seven leading oil firms worldwide. Total petrol, diesel, and kerosene supplies in 130 countries, including Nigeria. Total's global business activities include oil and gas exploration, refining, production, and trading. Total is also a major producer of chemicals and low-carbon energy. For more than 50 years, Total Nigeria Plc has been a pioneer in the downstream area of Nigeria's oil and gas business. Total opened its first gas station in Lagos, Nigeria, in 1956.

Company's Activities



Total Nigeria Milestone

Source: Total (2022)

The company maintains 500 service stations, 19 customer service stations, several industrial outlets, five gasoline depots, distribution factories, and warehouses in Western, Northern, and Eastern Nigeria. Lagos state in Nigeria is where the headquarter of Total Nigeria is located. Figure below illustrates the crucial aspect of Total Nigeria Plc. Total Nigeria generates and distributes electricity, natural gas, and petroleum in Nigeria. The company claims its 100,000 employees are dedicated to making energy better, cheaper, more reliable, cleaner, and available to as many people as possible. The company's long-term goal is to become a reputable energy powerhouse. The company's net worth is estimated to be $120.2billion (Total, 2022)**.**

Appendix C Data Transcribe and Interpretation

Appendix C.1 NNPC Respondent Views

Data Transcribe and Interpretation for NNPC on Question 1

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 1. How can supply chain collaboration improve performance in the oil and gas industry?

No	Respondents	Question 1: Have supply chain collaboration been fully adopted in the oil and gas industry in Nigeria? If yes, how?	Question 2: Do you think the collaborative supply chain's adoption will help improve performance in the oil and gas industry in Nigeria?	Question 3: How can you measure performance in the oil and gas sector?
	MNNPC	Yes, supply chain collaboration has been fully implemented in our organisation because as an organisation that is involved in the distribution of oil and gas which is a national most needed products so there is every need to ensure the effective and efficient flow of the product nationwide. For the sustainability of our operation in this oil and gas industry collaboration is highly needed with both our customers and suppliers. The organisation valued its relationship with partners and try its best to close any gap that could be found in chains of operations by creating trust and good relationship for effective delivery and satisfaction.	Yes, based on my experience I think supply chain collaboration is beneficial to our organisation performance in terms of efficiency, cost reduction and shortened lead-time in the delivery and distribution of oil and gas products. It is important to state here that collaboration has been helping our organisation and will continue to support our organisation achieve success in other areas of our operations.	In my opinion, performance can be measured in two ways which include internal and external. From the view of the internal operation of our company it is important to keep an eye on quality product distribution and effective customer satisfaction, which is more of good planning, while from the external viewpoint of external measures our organisation try as much to ensure flexibility, timeliness and good relationship with suppliers and customers for efficient allocation of resources and responsiveness.
2	MNNPC	Yes, it is fully adopted in my opinion the major areas I can confirm to you on our collaboration include the goal alignment, invest in the infrastructure and people to training which help the organisation in performance management.	Yes, performance can be improved through effective collaboration with suppliers by sharing sensitive information such as better order fulfilment. For example, continuous supplies and better resource utilisation.	Based on my experience, performance can be measured by setting up KPIs and they are reviewed annually for effective improvement if there is need. The KPIs that are much important to our operation include consistent supplies, lead time and quality management.

3	**MNNPC**	Yes, it has been adopted and this is eminent in our operations. Collaboration is the main approach that has been facilitating our cordial relationship with suppliers and customers.	Yes, it is possible that adopted collaboration can enable efficient supply chain and when resources such as information flow among partners and timely order management results in performance improvement in the supply chain.	I think the important strategies employed for performance measurement should be based on input and output. This is all about the effective management of internal and external factors that enables smooth flow of resources and profit making.
4	**ENNPC**	Yes, it is having been adopted and our organisation was one of the first to implement collaboration in Nigerian oil and gas sector because we are the major company oil and gas distribution. It was necessary for us to set the pace for other to follow and it is paying off.	Yes, but I want you to what is supply chain collaboration first, this typically means organisations working together in the supply chain, sharing objectives, and focusing on costs reduction. These brief strategies if managed well can improve customer service and the supply chain performance to some extent.	I have been working with this organisation for several years, there are several ways for performance measurement and largely in different context, it could be financial success, operation success and administrative which are evaluated using different standard and measure, but overall measures should focus on achieving the organisation objectives, consistency, and sustainability.
5	**ENNPC**	Yes, it has been fully adopted and it is working for relationship creation and ensure orderly conduct of business activities. It also facilitates the teamwork and stability of our organisation performance.	I totally agreed that collaboration will help performance improvement in the oil and gas industry in Nigeria because it has been implemented in many organisations proven to be working for the betterment of the organisation. I think it is a sure way for performance improvement and business sustainability	For an organisation like ours which is involved with distribution of product, performance can be measured by availability of product, effective warehouse operation and transportation to enable effective distribution of oil and gas.
6	**ENNPC**	Yes, it has been fully adopted	Yes, supply chain collaboration adopted has been yielding fruits because it has been helping our organisation to overcome strike by keeping consistent supply which can be achieved by good leadership resulting to teamwork and clear policies on issues.	Performance is a difficult thing to be measured because it involves many challenging steps, but our organisation is trying. We normally conduct quarterly review on policy, financial flows, and relationship with partners.

7	**ENNPC**	Yes, it has been adopted	Yes, supply chain collaboration is very important tool in the success of an organisation, there is a saying that a tree cannot make a forest, therefore, collaboration enables information sharing leading to enhanced knowledge across the chain that allows performance improvement.	My experience is more in the operation section which performance can be measured considering input and output. It is expected that an organisation should have effective input to sustain its operation and the transformation should be efficient to enable quality output.
8	**ENNPC**	Yes, it has been adopted.	Yes, for effective demand chain management, the supply chain structure must be aligned considering the need customers which can be better managed in collaboration rather than isolation. I agree that collaboration can lead to performance improvement.	It is obvious that performance can be measured by the level of efficiency, customer satisfaction and accountability in the system. This accountability could result to clear policy, structure alignment.
		Summary of the transcribed data for sub - question 1 The first sub-question 1 was the confirmation of the fully implementation of supply chain collaboration in the organisation and it was confirmed by the respondents that the collaboration is key element required for the success and sustainability of the organisation by pointing out the roles played such as connectivity of suppliers, customers, and their organisation for effective operation.	**Summary of the transcribed data for sub - question 2** From the interviews, respondents all agreed that collaborative supply chain adopted can help in performance in their organisation through information sharing, cost reduction, good leadership and enhance knowledge.	**Summary of the transcribed data for sub - question 3** The third sub-question was designed to bring out the how performance can be measured. The researcher was made to understand that there are different ways of measuring performance which include internal and external measures, input and output, flexibility, and timeliness.

Data Transcribe and Interpretation for NNPC on Question 2

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 2. What are the enablers of supply chain collaboration leading performance improvement in oil and gas industry?

No	Respondents	Question 1: What are the key enablers of supply chain collaboration in your organisation?	Question 2: How sustainable is the collaboration between you and your partners?	Question 3: Can supply chain performance be improved without collaboration? If yes, what are the alternatives?
1	MNNPC	My view could be cantered on inclusive decision making, which means involving all partners in decision making. This is vital in the organisation operation as it takes care of risks, costs and flow of resources which ensure sustainability.	One of the ways to sustain collaboration with partners is thrust trust. It is important to keep level trust among parties especially with customers and suppliers.	Yes, in as much as collaboration is important business can survive without it. The key elements that can improve an organisation performance are focus to meeting customers demand, strategic location, and value of the product.
2	MNNPC	Clear policies and communication are our primary enablers in the business, but I must state clear that collaboration enablers differ from sections and department because what may work here may not work in another unit or department. Clear policies and communication can strengthen trust and transparency resulting to effective allocation of resources.	It is important to avoid complicated policy and we ensure to create relationship that can stand test of time.	Yes, it is possible to improve business performance without collaboration especially an organisation operating a monopolistic business and the nature of environment. In this situation such organisation can improve its performance without partnership, but it is very difficult in a highly competitive environment.
3	MNNPC	Leadership quality play a very vital role in actualisation of organisation goals and objectives which is evidence in operation and success recorded so far. A good leader tries to implement what will lead to success of the organisation and always looking for effective channels of partners with credible suppliers for consistent supplies.	Our collaboration with partners rest on the effective management of relationship and trust. These are the key aspects to be consider superior in any partnership.	Collaboration is needed, but an organisation can still improve its performance without partnering with another by focusing on its operation and doing what is needed and committed in delivery quality product timely to customers.
4	ENNPC	Internal and external alignment of objectives is important in the effective operation looking at the internal structure and external factors (employees and suppliers) which are crucial for the success of every organisation.	It is important to understand a stable collaboration require that level of inclusiveness. For collaboration to last long the parties must be involved in common decision making which will enable transparency and accountability leading to sustainability.	Collaboration is just one of several aspect to improving an organisation performance and organisations can improve their performance without collaboration by doing what is right and coordinating business activities justly. They can be achieved the effective monitoring and development and as well as research and development.

5	**ENNPC**	Costs management is one our strong strategies which allows us to predict future expenses to reduce the chances of budget speed over.	Our collaboration with partners has been successful in so many areas as evidence in the consistent distribution and customers satisfaction.	Collaboration is important but it soes not mean that an organisation should dependent collaboration to improve its performance. Organisations can improve their performance by prioritising on things that are relevant for success.
6	**ENNPC**	Information and financial flows. Collaboration can be successful when there is effective information sharing about what is needed, when it is needed and how to implement it and the finally the financial availability to ensure payment as required.	I have been involved in the monitoring and distribution of our products and I discover the importance of collaboration as culture of organisations differs therefore partnership is needed to balance operation. The success of collaboration in our organisation is evidence in the consistent supplier to our customers.	Yes, effective planning is important because if an organisation did not plan its resources and have collaboration with partners therefore the performance will not improvement. Effective planning is the foundation for collaboration.
7	**ENNPC**	Infrastructural development, this is crucial because an organisation may have the best policies and plans but without good infrastructure the organisation can still face set back or delays in delivery of its goods and services as expected. Therefore, infrastructural development is needed for effective supply chain collaboration.	I was involved in the supervision of the distribution of oil and gas product, and it has been successful which the level of achievement can be actualised through effective partnership.	Yes, in fact a business can still improve its performance by acknowledge/understanding it strengths and weaknesses which is very important.
8	**ENNPC**	Infrastructure and trust an organisation like ours need infrastructure and trust to enable efficient distribution of our product, order placement and receiving supplies.	I can say our collaboration with partners is 95% success because we always received supplies as expected and we try as much to deliver quality product to customers as a result of commitment.	Yes, another alternative for performance improvement includes clear communication of organisation vision and mission.

	Summary of the transcribed data for sub - question 1	**Summary of the transcribed data for sub - question 2**
	From the transcribed data the researcher understand that the mention supply chain collaboration includes inclusive decision making, clear policies and communication, leadership quality, internal and external alignment of objectives, costs management, information and financial flows, and infrastructural development.	This question makes the researcher to understand that there is success collaboration with partners which has been helping in the effective flows of resources in the organisation

Summary of the transcribed data for sub - question 3

Most of the responses pointed out clearly that collaboration is important, but businesses can survive and improve performance through focus, commitment, research and development, monitoring, monopolistic operation, and strategic location.

Data Transcribe and Interpretation for NNPC on Question 3

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 3. What are the inhibitors of supply chain performance in the oil and gas industry?

No	Respondents	Question 1: What are the supply chain collaboration inhibitors which affect your organisational performance?	Question 2: How do you manage challenges in the supply chain collaboration which inhibit you from achieving the targeted goals?	Question 3: How does lack of collaboration affect your organisational performance?
1	MNNPC	As a manager, I can categorically tell you that Covid-19 is the primary inhibitor of our operations and has impacted negatively in several aspects or elements of the organisation. Each of our sector operating unit is affected due to rules and regulations of conducting businesses. These effects cut across so many areas beginning from planning, decision making, logistics and distribution, marketing, staffing and labour force, time management and delay delivery in the system which is the major challenges faced by organisations not only our company. How and why? You should be aware that a lot has happened in this period of Pandemic which include restricted movement, work at home, boarder closure and countries lockdown has affected the operations at various stages. Mind you with lack of planning, inadequate communication and labour force shortage supply chain is and will continue to be greatly affected leading to delay in delivery of products and services, marketing, logistics and distributions of products which is exactly what we are facing currently in our company. An organisation can have good collaboration with its partners, have the best plan, policies, and ideas but with these mentioned inhibitors in place it will be very hard to achieve the desire success.	There is no easy way in business, therefore our organisation is determined to remain focus, consistent in our operations and committed in doing what work better for us again and again which is part of continues improvement.	Let me bring to your understanding the importance of collaboration in this way that "a tree cannot make a foresting" making it vital for organisations to come together and work in unity in order to achieve the desire success. Please get me right here, there are still companies that are operating independently without collaborating and they are doing well, but it better for organisations to collaborate with each other by sharing information that will promote unity of purpose. A lack of collaboration can affect organisation performance and discourages teamwork, lose trust and motivation of staff.

2	**MNNPC**	The key inhibitors of supply collaboration noticeable in our organisation that can affect our business performance are lack of information flow in the system which makes it very difficult to understand the happenings in the business environment resulting to inaccurate forecasting and poor market prediction. Poor infrastructure is another sensitive aspect that could hinder effective operation of an organisation. Looking at it in detail, supply chain collaboration can only be effective when there is an effective delivery of products and services which can be actualised through good road network for timely transportation and distribution of products, good internet connectivity for speedy communication among parties involved in business and avoid delays in the system therefore saving cost. It is important to let you know that in our contemporary society Covid-19 pandemic has impacted negatively to the overall performance of organisations including our company in terms of policy and decision making, logistics and other risks encountered leading to business losses particularly finances.	Order placement and market survey is an integral part of managing business. When order placement is well managed it makes our organisation to better position its operation to achieve desire success. Having a good market survey guide the operation our organisation and direct its activities which allows managers plan effectively to meet the objectives of the company business.	In short without collaboration in business especially in the oil and gas industry where actions are needed, decision making can be difficult in the system because collaboration help build unity of purpose, effective flow of information and promote standard and quality which without it could result to confusion.
3	**MNNPC**	I want to put to it you in a very simple term that non-availability of the factors that enables effective supply chain collaboration of an organisation is a barrier or an inhibitor. There are several factors that without them an organisation does not function or will underperform such as information sharing, finance or working capital, suppliers' relationship, trust, knowledge, and good planning. We must not ignore the impact of Covid-19 in destroying the good operation performance recorded by companies due to stringent operation conditions for business. The rules of stay at home, restricted movement and nations lockdown were not good for business operations.	Flexibility in our mode of operation permit us to collaborate effectively with our partners. Flexibility enables us to share sensitive information regarding business transactions. It is important for every organisation allow flexibility in its activities which provide transparency that result to performance improvement.	Slow productivity and response to demand can be challenging as supplier tend to treat their collaborative partner with urgency and dignity. When there is lack of collaboration in the system, the organisation in its operation face indecision and unclear direction and road map. These will hinder the organisation under perform.

4	**ENNPC**	I have been working in the operation unit of the company for several years now and the prominent inhibitors in the supply chain collaboration include lack of alignment of goals because companies in collaboration sometimes never have same ideology making it very difficult to align them. Lack of risk acceptance by parties in the collaboration therefore many companies decided not to collaborate in order to avoid risk. Collaboration with parties in the supply chain result to bureaucracy as all parties are required to contribute in each of the operation procedure or process which decision making become too complex resulting to delays in the system.	Effective communication is one of the strategies we employed in managing challenges. When communication is effectively administered in the conduct of an organisation activities it has several ways of impacting meaningfully to the performance of the organisation through control of resource, its allocation and effective decision making.	The organisation may find it difficult to achieve wider targets and goals that can lead to success. A lack of collaboration in a company will make it difficult to market the best ideas. Collaboration is so vital in the day to day running of an organisation as it provides the link between parties for mutual operation. it is right organisations align their goals and target in a collaborative manner to achieve desire outcome.
5	**ENNPC**	One primary factor that could act against the operation success of our organisation is time which we never underestimate it. Time can affect structure of the organisation, put the company out of market, keep the company in the state of uncertainty. Therefore, it is important for organisations to understand that timely collaboration, suppliers' selection, and decision making is key to overcoming business barriers.	Effective time management is the key for success. In very business time is vital for planning, decision making, allocation of resources timely is key and activity monitoring and evaluation.	In a situation where there is lack of collaborative in an organisation the staff become disengaged, set back in policy making, customer and partners lose trust and motivation of both parties become weak. the simple fact is that an organisation can succeed in its project when there is teamwork and avoiding taking huge risk.
6	**ENNPC**	The main supply chain collaboration inhibitors include lack of information sharing, relationship management and trust, poor quality products and services offered, poor decision making and unclear company goals and objectives. An organisation performance can be affected when there is lack of customer focus, people engagement, good leadership and continuous improvement of products and services.	Transfer of skills and training is another area I will suggest being the best approach in managing challenges. As a supervisor in the field of operations and logistics of the company, I can tell that skills transfer help me and other managers to relate with our fellow co-workers and has helped us to deal with our subordinates, customers and partners which allows for smooth flow of activities in our organisation. The success of an organisation is determined by vital skills employed to effectively manage the affairs of the organisation for success of its objectives.	A lack of collaboration affects productivity of an organisation when there is unclear direction and no planning in place. This becomes very obvious that collaboration help organisations to overcome these challenges as collaborative approaches enable companies to align their goals, vision, and mission through reduction of uncertainty.

7	**ENNPC**	Am very much aware that you have interviewed some of our staff and they must have provided you with some inhibitors that are working against our collaboration performance, but I will still emphasis on some of them such as relationship management and trust. These are two difficult areas to manage in any successful collaboration and you may be aware that collaborating with unreliable and unfaithful partner can be dangerous to operation as there are high chances of failure.	Sincerely your questions are somehow challenging to me, but I must be put it to you that managing challenges is not as easy as you may think but an organisation must maintain consistency in its policy and commitment to ensure that the organisation goals are achieved.	Lack of collaboration affection innovation and creativity as organisation needed connectivity, information sharing and effective communication to be able the achieve the required performance. So, a lack of collaboration even the organisation employees, customers and partners may not be aware of happenings in the organisation as there is limited ideas and understanding which affect creativity and innovative mind.
8	**ENNPC**	Channel of communication in an inhibitor we are facing. I as a supervisor I can tell you that the effective channel we reach out customers and other business associate is by phone or text message. However, the challenge is that most areas in Nigeria experience poor network services such MTN, Glo and Airtel network connectivity in some cities making it difficult communicate effective when issue urgent business opportunities arise.	It is very important that organisations understand that managing relationship is crucial for the success of the organisation operations. We at our level, our organisation prioritised relationship management which is key is teamwork management, build creditability and respect to customers and partners.	This has greater influence on any organisation performance. It can impact negatively to the performance of an organisation when there is poor communication in the system. Collaboration cannot be successful without effective communication.
		Summary of the transcribed data for sub - question 1 From the transcribed data, the researcher understands that factors inhibiting supply chain collaboration include Covid-19 pandemic, information sharing, infrastructural development, decision making, unclear policies, communication, leadership quality, alignment of goals and objectives, financial flows, and relationship management and trust.	**Summary of the transcribed data for sub - question 2** From the transcribed data, the researcher understands that some of the approaches employed by managers and supervisors in managing challenges faced by the company include commitment, order placement, flexibility, effective communication, effective time management, transfer of skills, consistency, and relationship management.	**Summary of the transcribed data for sub - question 3** From the transcribed data, the researcher understand that a lack of collaboration can affect organisation performance as it discourages teamwork, decision making can be difficult, slow productivity, difficult to achieve organisational wider targets, organisation become disengaged, lack of connectivity to each other and resulting to poor communication.

Data Transcribe and Interpretation for NNPC on Question

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Question 1: What other strategies you have employed in the implementation of supply chain collaboration?

No	Respondents	
1	MNNPC	Yes, I totally agreed that the main enablers and inhibitors of supply chain collaborations are lack of mobile phone network service providers which in most cases customers are un-able to receive mobile messages. This is due to poor net or no network services because most of the of our partners operate in the outskirts of cities which make it difficult to be reached by phone call or text message. In a case where network services are available is an enabler and unavailability become an inhibitor. Am happy to let you know that at our organisation level we try as much prioritise quality products distribution and good services to client as enablers which are other strategies employed by our organisation.
2	**MNNPC**	I agree with your identified inhibitors of supply chain collaboration especially trust, information sharing, and communication plays a significant role in the sustenance of our collaboration, but it important to note we are operating in a dynamic environment therefore we try to be flexible and proactive on issues of manging supply chain. In regard to your question on other strategies employed by our organisation in the implementation of supply chain collaboration, we consider effective and efficient time management to be our top priority. The organisation ensure order management are timely and paperwork is well coordinated to avoid delays due to bureaucratic processes involved in the operations of the organisation. The respondent still maintained his position that the greatest inhibitors to supply chain collaboration in the oil and gas industry include managing trust among parties or at internal organisation level, information sharing, and communication become difficult when there is lack of commitment but when there is full integration and functional operation it is considered as enablers.
3	**MNNPC**	It is accepted that those identified enablers from the literature are key in supply chain collaboration but the absence of them become inhibiting factors. In my opinion, I strongly believed that collaboration should be more focused on quality management which is a major tool that bind organisations together and it is equally one of our criteria for partnership. The above mentioned are other strategies to employed in order to successful collaboration.
4	**ENNPC**	I have been working for this organisation for several years and I can agree with you that the identified factors can facilitate collaboration among organisations as enablers and also serve as inhibitors to the same system especially information sharing. So, one has to be careful to whom to share sensitive information with, which is one reason that some organisations found it so difficult to share. Our strategies toward supply chain collaboration implementation are more focused on customers satisfaction and effective product delivery.

5	**ENNPC**	The strategies employed by our organisation for the implementation of supply chain collaboration include determination and focus, goal alignment and continuous improvement. I 100% agreed with your identified enablers because effective collaboration or partnerships needed trust, infrastructural development teamwork and efficient information sharing in order to achieve common goal.
6	**ENNPC**	Yes, am aware of some of the key factors you have identified in your literature review, but I want to add that for sustainable collaboration there must be effective innovation and quality management to keep the business moving. These two factors are important for short- and long-term collaboration with partners. Innovation and quality management enable an organisation to remain focus on effective service delivery and customers satisfaction.
7	**ENNPC**	My personal views to this question are that our organisation always pride itself with accountability and transparent operations which is our prime factors for success. I wish to make my point very clear that accountability and transparency are fundamental to achieving trust, information sharing and others as you rightly identified in your literature reviewed.
8	**ENNPC**	Yes, it is obvious that collaboration is the strategy for organisation supply chain sustainability. At our level of operation, we consider inclusiveness which result to effective policy and decision making and as well as goal or target setting. This is important in our organisation but not ignoring the fact that infrastructure, communication, and finance has vital roles to play in the sustainability and effectiveness of supply chain.

Summary of the Transcribed Data for question 4

The respondents interviewed expressed their understanding of the already identified factors which could be enablers and inhibitors of supply chain collaboration and they were able to point out some novel strategies employed for the implementation of supply chain collaboration which include accountability and transparency, time management, quality management and goal setting.

Appendix C.2 Total Nigeria Views

Data Transcribe and Interpretation for Total Nigeria on Question 1

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 1. How can supply chain collaboration improve performance in the oil and gas industry?

No	**Respondents**	**Question 1: Have supply chain collaboration been fully adopted in the oil and gas industry in Nigeria? If yes, how?**	**Question 2: Do you think the collaborative supply chain's adoption will help improve performance in the oil and gas industry in Nigeria?**	**Question 3: How can you measure performance in the oil and gas sector?**

	MTOTAL	The manager accepted and stated the following reasons: effective communication, trust among parties and quality product and services are key in the supply chain collaboration.	Yes, the respondent pointed out the elements that connect to decision making include, costs minimisation, good connectivity, and risk avoidance.	The respondent suggested some key points for measuring performance which include target, evaluation, timeliness, and good planning
2	**MTOTAL**	Yes, Through the following reasons: customer satisfaction, teamwork, and effective joint venture.	Yes, it is helpful in monitoring and evaluation which essential for the improvement of an organisation performance.	The manager noted that the performance measurement in the oil and gas industry is identified as constant learning, quality improvement, monitoring and reporting
3	**MTOTAL**	yes, the performance of our logistics service unit was hence through collaboration with the company's logistic partnerships	Yes, it supplies chain performance can be improved when there is trust the can enable effective collaboration among organisations the unity of purpose, observing all the key performance indicators.	The respondent presented that performance can be measured by the level of success record by achieving the KPIs.
4	**ETOTAL**	Yes, communication and information sharing are the key to success. Promote product standard and its effective flow.	Yes, it is obvious that it can help in performance improvement by considering the key components such as effective communication and making the right decision.	Trust me, performance can be measured financial flow of the organisation and its successful operation.
5	**ETOTAL**	Yes, effective information sharing, market survey or piloting and effective distribution channel is necessary.	Yes, it is possible, performance can be improved when their effective communication in the system, free expressing of views among parties.	the interviewee stated that performance can be measured by capabilities to deliver on its commitment.
6	**ETOTAL**	Yes, communication is the first thing to be considered in the collaboration process and followed by trust between members.	Yes, an organisation performance can be improved if and only trust exist in the collaboration.	Performance can be measured when an organisation optimally in the business with losses at most operate at break-even.
7	**ETOTAL**	Yes, effective policy implementation through clear communication in the system	Yes, but the prime tool for performance improvement is teamwork and it include trust, effective communication and timely decision making and as well knowing what to do at the right time. Therefore, is of important in this case to consider teamwork as the fundamental factor for collaboration.	An organisation performance can be measured by actualising the KPIs and target set for the business year.
8	**ETOTAL**	Yes, clear policy will sustain every of the collaborative elements in the supply chain	Yes, controlling the levels of operation by ensuring that decision about the business is jointly taken and timely.	Performance can be measured an organisation carry out self-assessment to determine it gain and loss.
		Summary of the transcribed data for sub - question 1	**Summary of the transcribed data for sub - question 2**	**Summary of the transcribed data for sub - question 3**

The first sub-question 1 was the confirmation of the fully implementation and respondents recommended the following components such as communication, information sharing, clear policy implementation, trust, and effective distribution channels.	From the interviews, respondents all agreed that collaborative supply chain adopted can help in performance through trust, timely decision making, effective communication and risk management.	The third sub-question was designed to bring out the how performance can be measured. The researcher was made to understand that there are different ways of measuring performance which include KPIs, gain and loss, financial flow timeliness and customers satisfaction.

Data Transcribe and Interpretation for Total Nigeria on Question 2

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 2. What are the enablers of supply chain collaboration leading performance improvement in oil and gas industry?

No	Respondents	Question 1: What are the key enablers of supply chain collaboration in your organisation?	Question 2: How sustainable is the collaboration between you and your partners?	Question 3: Can supply chain performance be improved without collaboration? If yes, what are the alternatives?
1	MTOTAL	Information technology, finance and effective within the system (internal) and relationship management with our partners.	It is well connected which is important for the passage of information ourselves and sharing of sensitive company communications. This actually help us in the decision-making process.	Yes, an organisation should focus on quality management.
2	MTOTAL	Total control on resources which could be human, finance and raw materials. Every organisation must develop the culture that allow the effective application and allocation of resource that yield a positive result needed by the organisation which is what collaboration is helping us to achieve	Goal alignment provide our organisation with commitment and fucus on the core values of the organisation is the key to me. This has been helping us to operate effectively with our partners	Yes, quality management through continuous improvement, leadership, people engagement, customers satisfaction and relationship management.
3	MTOTAL	Trust and leadership management is very important. This must be supported by good policy, effective communication, and information sharing. Organisation culture must be promoted by managing resources effectively to ensure success achieved.	The effective management of time is essential in any collaboration, and I believe that is the only thing that keep us moving.	Yes, it better for companies to build internal teamwork and be able to prioritise on bottle neck items or operation for success.
4	ETOTAL	Organisational goals and objectives must meet the expected quality. This will help the organisation to target and monitor its operation. The key ideas should be focus on innovation and quality management.	Sustainable supply chain collaboration lies solely on trust and building relationships but not forgetting that other factors play some important role for the success of a collaboration such finance and communication.	An organisation can succeed with or without collaboration when it focusses to identify its strength, weakness, opportunities, and threats (SWOT).

5	**ETOTAL**	Trust, accountability, costs management, good planning, clear policy, and performance measurement through KPIs should be encouraged. An organisation can succeed in its goals when there is full implementation of these components that cement or glue the foundation of any collaboration.	channels of communication are necessary for the maintenance of company's collaboration. It important to note that a business cannot survive without getting the rightful information and the spreading the information without stress to partners.	Doing the right thing at the right time.
6	**ETOTAL**	Relationship management and trust are prime factors needed in collaboration, but for a business to succeed you more than that: this includes strategic thinking and friendly environment for business survival.	Inclusive decision making with parties in the business, teamwork, trust, and clear policy communication can unite different companies together which is part of our strategy.	Yes, when things are well coordinated. An organisation should ensure that products and services meet the standard.
7	**ETOTAL**	A company is required to partner with right partners who have the capacity, willingness and trustworthy to perform. This consideration is very important in the collaboration and not only in supply chain management by general operation.	Collaboration can be sustained when their constant review of policy, trust among parties and promoting core company's values.	Yes, focusing on what works better for you.
8	**ETOTAL**	Communication and information sharing is the vital tool to be considered in the collaboration of partners. It is important that organisations consider communication as prime factor for success.	Effective decision making can result to inclusiveness, good planning, and relationship management.	Yes, avoid complication ideas and concentrate build the brand of you company.
		Summary of the transcribed data for sub - question 1	**Summary of the transcribed data for sub - question 2**	**Summary of the transcribed data for sub - question 3**
		From the transcribed data the researcher understands that the mention supply chain collaboration trust, communication, capacity to deliver, good planning and affection of resources and relationship management.	This question makes the researcher to understand that company's collaboration with partners can be sustained by trust, good planning, communication, promoting core values of the company, clear decision, and information sharing	Most of the responses pointed out clearly that collaboration is important, but businesses can survive and improve performance through quality management, focus, commitment, time management, coordination and conducting SWOT.

Data Transcribe and Interpretation for Total Nigeria on Question 3

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 3. What are the inhibitors of supply chain performance in the oil and gas industry?

No	Respondents	Question 1: What are the supply chain collaboration inhibitors which affect your organisational performance?	Question 2: How do you manage challenges in the supply chain collaboration which inhibit you from achieving the targeted goals?	Question 3: How does lack of collaboration affect your organisational performance?
1	MTOTAL	I wish to state here that Covid-19 as impacted negatively to our operation, and we are still yet to recover from its effect on our operation. During the period of lockdown and restriction even when we have collaborative effort with our suppliers, but it was still difficult to achieve the flow of materials and information as most of the workers were working at home and the concentration was lost. Operations were not smooth, for example, here in Nigeria it was challenge as people believe on face to face which was not there again.	There is no easy way in business, therefore our organisation is determined to remain focus, consistent in our operations and committed in doing what work better for us again and again which is part of continues improvement.	Let me bring to your understanding the importance of collaboration in this way that "a tree cannot make a foresting" making it vital for organisations to come together and work in unity in order to achieve the desire success. Please get me right here, there are still companies that are operating independently without collaborating and they are doing well, but it better for organisations to collaborate with each other by sharing information that will promote unity of purpose. A lack of collaboration can affect organisation performance and discourages teamwork, lose trust and motivation of staff.
2	MTOTAL	There should be access control to prevent unauthorised user for accessing key information about our organisation operations particularly in era of online operations. A society like ours, it is difficult to effectively control cybercrime and whenever such violations/breaches occur between collaborative parties is cause doubt and as a result of lack of security to operation organisations are not willing to collaboration with each other.	Order placement and market survey is an integral part of managing business. When order placement is well managed it makes our organisation to better position its operation to achieve desire success. Having a good market survey guide the operation our organisation and direct its activities which allows managers plan effectively to meet the objectives of the company business.	In short without collaboration in business especially in the oil and gas industry where actions are needed, decision making can be difficult in the system because collaboration help build unity of purpose, effective flow of information and promote standard and quality which without it could result to confusion.

3	**MTOTAL**	I want to put to it you in a very simple term that non-availability of the factors that enables effective supply chain collaboration of an organisation is a barrier or an inhibitor. There are several factors that without them an organisation does not function or will underperform such as information sharing, finance or working capital, suppliers' relationship, trust, knowledge, and good planning. We must not ignore the impact of Covid-19 in destroying the good operation performance recorded by companies due to stringent operation conditions for business. The rules of stay at home, restricted movement and nations lockdown were not good for business operations.	Flexibility in our mode of operation permit us to collaborate effectively with our partners. Flexibility enables us to share sensitive information regarding business transactions. It is important for every organisation allow flexibility in its activities which provide transparency that result to performance improvement.	Slow productivity and response to demand can be challenging as supplier tend to treat their collaborative partner with urgency and dignity. When there is lack of collaboration in the system, the organisation in its operation face indecision and unclear direction and road map. These will hinder the organisation under perform.
4	**ETOTAL**	I have been working in the operation unit of the company for several years now and the prominent inhibitors in the supply chain collaboration include lack of alignment of goals because companies in collaboration sometimes never have same ideology making it very difficult to align them. Lack of risk acceptance by parties in the collaboration therefore many companies decided not to collaborate in order to avoid risk. Collaboration with parties in the supply chain result to bureaucracy as all parties are required to contribute in each of the operation procedure or process which decision making become too complex resulting to delays in the system.	Effective communication is one of the strategies we employed in managing challenges. When communication is effectively administered in the conduct of an organisation activities it has several ways of impacting meaningfully to the performance of the organisation through control of resource, its allocation and effective decision making.	The organisation may find it difficult to achieve its vision and goals when there is bad leadership. this may possible impact negatively to collaboration of a company. poor leadership will make it difficult to an organisation to make use of its best ideas. it operates against collaboration that connect members together, but parties may not feel comfortable leadership without vision.

5	**ETOTAL**	One primary factor that could act against the operation success of our organisation is time which we never underestimate it. Time can affect structure of the organisation, put the company out of market, keep the company in the state of uncertainty. Therefore, it is important for organisations to understand that timely collaboration, suppliers' selection, and decision making is key to overcoming business barriers.	Effective time management is the key for success. In very business time is vital for planning, decision making, allocation of resources timely is key and activity monitoring and evaluation.	Capital is needed for effective day to day running of an organisation. When there is inadequate flow of finance in an organisation may not be able to meet its operations as expectation. Capital is essential for the successful running of an organisation.
6	**ETOTAL**	Commitment is a prime factor to be watched supply chain collaboration because the success of an organisation determines by its focus and delivering on every commitment. commitment is the binding factor for trust, relationship creation and effective decision making which re mostly objectives of organisations.	Transfer of skills and training is another area I will suggest being the best approach in managing challenges. As a supervisor in the field of operations and logistics of the company, I can tell that skills transfer help me and other managers to relate with our fellow co-workers and has helped us to deal with our subordinates, customers and partners which allows for smooth flow of activities in our organisation. The success of an organisation is determined by vital skills employed to effectively manage the affairs of the organisation for success of its objectives.	A lack of clear policy affects collaboration of an organisation and its performance. when there is unclear policy, it affects direction and planning. organisation can overcome challenges through purposive leadership and teamwork as unclear policy can result to uncertainty.
7	**ETOTAL**	Am very much aware that you have interviewed some of our staff and they must have provided you with some inhibitors that are working against our collaboration performance, but I will still emphasis on some of them such as relationship management and trust. These are two difficult areas to manage in any successful collaboration and you may be aware that collaborating with unreliable and unfaithful partner can be dangerous to operation as there are high chances of failure.	Sincerely your questions are somehow challenging to me, but I must be put it to you that managing challenges is not as easy as you may think but an organisation must maintain consistency in its policy and commitment to ensure that the organisation goals are achieved.	Lack of collaboration affection innovation and creativity as organisation needed connectivity, information sharing and effective communication to be able the achieve the required performance. So, a lack of collaboration even the organisation employees, customers and partners may not be aware of happenings in the organisation as there is limited ideas and understanding which affect creativity and innovative mind.

8	**ETOTAL**	Channel of communication in an inhibitor we are facing. I as a supervisor I can tell you that the effective channel we reach out customers and other business associate is by phone or text message. However, the challenge is that most areas in Nigeria experience poor network services such MTN, Glo and Airtel network connectivity in some cities making it difficult communicate effective when issue urgent business opportunities arise.	It is very important that organisations understand that managing relationship is crucial for the success of the organisation operations. We at our level, our organisation prioritised relationship management which is key is teamwork management, build creditability and respect to customers and partners.	This has greater influence on any organisation performance. It can impact negatively to the performance of an organisation when there is poor communication in the system. Collaboration cannot be successful without effective communication.
		Summary of the transcribed data for sub - question 1	**Summary of the transcribed data for sub - question 2**	**Summary of the transcribed data for sub - question 3**
		From the transcribed data, the researcher understands that factors inhibiting supply chain collaboration include Covid-19 pandemic, information sharing, infrastructural development, decision making, unclear policies, communication, leadership quality, alignment of goals and objectives, financial flows, and relationship management and trust.	From the transcribed data, the researcher understands that some of the approaches employed by managers and supervisors in managing challenges faced by the company include commitment, order placement, flexibility, effective communication, effective time management, transfer of skills, consistency, and relationship management.	From the transcribed data, the researcher understand that a lack of collaboration can affect organisation performance as it discourages teamwork, decision making can be difficult, slow productivity, difficult to achieve organisational wider targets, organisation become disengaged, lack of connectivity to each other and resulting to poor communication.

Data Transcribe and Interpretation for Total Nigeria on Question 4

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 4 What other strategies you have employed in the implementation of supply chain collaboration?

		Question 1: What other strategies you have employed in the implementation of supply chain collaboration?
No	**Respondents**	
1	**MTOTAL**	Yes, I agreed with your identified components which could enable and inhibit a business operation. Our organisation is focused on customers fulfilment and effective time management which is key to business success is to avoid the unnecessary expenditure.

2	**MTOTAL**	Your informed literature is right, but I will still add some to it. Collaboration should be more of commitment and people oriented but the organisation on its own should seek to make effective decision to support operation is supply chain.
3	**MTOTAL**	I agreed with your mentioned points, but I would wish to add that many organisations don't know what collaboration is, they believe that it is all about coming together. Collaboration can be successful when there is trust, commitment and transparency in policies and process. The other strategies employed by our organisation include customers satisfaction and accountability.
4	**ETOTAL**	Yes, I confirmed that your mentioned elements are part of enablers and inhibitor of a business operation. enablers can sometimes in turn be an inhibitor to a business especially when what is needed is not in place, it could affect the operation of the business and collaboration is part of the strategy. But a business can survive without collaboration when a business focus on continuous improvement and innovation of process that could align effective conduct of a business. Our is keen on process improvement and meaningful collaboration with parties.
5	**ETOTAL**	Process mentioning, and evaluation are part of the elements that constitute to a business success. All mentioned could impact positively and negatively and organisations engagement into collaboration with partners to enable them to achieve the goals and objective of the business. In the oil and gas industry collaboration is required and our organisation employed monitoring and evaluation to effectively manage relationship, develop trust among parties which is useful to customers satisfaction
6	**ETOTAL**	Yes, it is true that the mentioned components could influence collaboration and can as well affect it. Therefore, businesses should be careful when implementing the strategies. Collaboration should be cantered on the improvement of business which are alternative approaches employed include customer focus, integrated decision making and relationship building.
7	**ETOTAL**	Yes, the aforementioned elements can support an organisation effective implementation of its strategies. If not properly implemented could negatively affect the operation of business. The real essence of collaboration in business is to reduce operation costs and maximizing profit which is our key business strategy.

8	**ETOTAL**	Yes, the mentioned the factors impact on business as an enabler and inhibitor. It important that every developed its strategic operation to achieve the goals and objectives of the business. if an organisation cannot coordinate its operations therefore the best collaboration implemented will not work as there is lack of coordination which it will become a negative impact. An organisation is required to align its strategy with clear policy which is part of what we are doing to ensure the effective flow and coordination of materials and human resources. this has been successful in our organisation due to the simple strategies employed such as building a stronger relationship and teamwork.

Summary of the Transcribed Data for question 4

The respondents interviewed expressed their understanding of the already identified factors which could be enablers and inhibitors of supply chain collaboration and they were able to point out some novel strategies employed for the implementation of supply chain collaboration such as time management, innovation and accountability, commitment, costs reduction, develop trust and building effective relationship.

Appendix C.3 Rainoil Views

Data Transcribe and Interpretation for Rainoil on Question 1

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 1. How can supply chain collaboration improve performance in the oil and gas industry?

No	**Respondents**	**Question 1: Have supply chain collaboration been fully adopted in the oil and gas industry in Nigeria? If yes, how?**	**Question 2: Do you think the collaborative supply chain's adoption will help improve performance in the oil and gas industry in Nigeria?**	**Question 3: How can you measure performance in the oil and gas sector?**

	MRAIN	Yes, our organisation has collaborative supply chain in place and has been a major tool for our organisational success through effective decision making. It has been instrumental for the effective flow of product (oil and gas) which is a national most needed products so there is every need to ensure the effective and efficient flow of the product nationwide. Collaboration is needed for the sustainability of our organisation operations. The oil and gas industry are thus required high level of collaboration among parties that are involved (customers and suppliers). Collaboration enable decision making effective which is important in our operations as it help in promoting connectivity and build relationship which is vital in risk reduction.	I think supply chain collaboration has potentials necessary for improving our organisation performance in a market that is highly competitive in nature. Collaboration adoption can help organisations to remain focus, speedy delivery, and efficiency in the system.	In my view, an organisation performance can be improved when measured through leadership that enables effective monitoring and evaluation of activities that necessary for organisation success. This can be achieved through good planning and coordination of resources. It is important to make my point clear that performance can be improved when an organisation have its goals and objectives well aligned to enable its effective operation.
2	**MRAIN**	Yes, we have adopted it, but I cannot categorically say it fully implemented because there are areas in our operation that a lot of work need which is part continuous improvement, in my opinion, I can say we have achieved significant development relationship management which is key in collaboration and the time management is our prime concern. The above-mentioned points are essential for operation success of an organisation.	Yes, when there is effective performance management it will enable effective flow of resources and information sharing between parties that are involve in similar operation it will better for performance improvement because it will be helpful in policy alignment and operation direction will at ease and it provide much clarity of goals and objectives.	In measuring performance of an organisation, we need to first of all consider the set target, work road map and the availability of the enabling factors and conducive environment to business operation. This will help an organisation to plan effectively towards achieving the set goals and outcomes or result. These include human capital, finance, and resources.

3	**MRAIN**	Yes, our company has adopted collaborative supply chain and it has helping factors in our operations especially during this pandemic period. Collaboration has remained our key approach nowadays that has been facilitating our connectivity with clients and suppliers.	From my understanding it is yes that adopted collaboration in our supply chain and operation can only be facilitated when organisations align their goals and objectives which can be achieve by sharing business information and risk to avoid failure.	I think the important strategies for measuring performance is based on the financial turn over. The strategies can be achieved by carefully implementing cost reduction strategies and checklist procedure that will help in monitoring and evaluation.
4	**ERAIN**	Yes, supply chain collaboration has been adopted in our organisation and it is providing us the needed connection with our partners. It is instrumental in aligning our organisation goals and objective for success. Sincerely I wonder as a supervisor in the operations department what could have happened to us during this Covid-19 pandemic, but with effective collaboration with our partners in place we able to share ideas and I think can overcome all the challenges faced victoriously with the help of collaboration.	Collaborative supply chain has been implemented and its impact is immense especially in policy development and communication between our partners. Let take policy development and you will see that every organisation success rest on effective policy and good planning which is part of collaboration. Then communication is another vital aspect to be considered seriously because communication key to operation success which means that information about supply chain and order placement should communicated in clear terms.	There are many ways for performance measurement which include the context or perspective. Performance can be measured through financial breakthrough of the organisation and the achievement for the year.
5	**ERAIN**	Yes, it has been fully adopted and it I strongly believed that organisations can survive with collaboration because it is bridge that connects companies together working in building relationship and supporting information sharing and communication flow among organisations.	The oil and gas industry are a sector that collaboration is mostly needed because you are dealing with a delicate product that its distribution or general management involve speed and timely supply and we have adopted the collaborative strategy that is helping us determine the market structure and align our goals to achieve the desire success.	Organisation performance can be measured based of the quality of product and service offered. In order to maintain relevance and sustainability in the market our organisation has implemented continuous improvement approach as a way to monitor acceptability of our product and services in the wider market. This enables us to keep good relationship with our clients.

6	**ERAIN**	Yes, it has been adopted and I wish to let you know that there is no way an organisation can achieve 100% optimisation of collaboration therefore I cannot say we have implemented fully and efficient supply chain collaboration with our partners, but we are doing well in term of communication, information among ourselves, effective decision making and allocation of scarce resource. I cannot deny the fact that there are challenges in the system.	The success recorded so far by our organisation is part of collaboration adopted and is yielding result. In this modern approach of quality management, information sharing and aligning policy has impacted positively on performance improvement.	Effective relationship management is part of strategy employed by our organisation for performance improvement. The bottom is that profit making, and sustainability of business are some points to be considered when measuring performance of an organisation.
7	**ERAIN**	Yes, it has been adopted and it is better for organisations work as a team rather than working individually. This is helping organisation like ours to be flexible and respond timely to issues as information are shared among partners.	It is very important for organisations to collaborate in order achieve the desire result. The collaborative strategy enables organisation to predict business environment and set target and align its policy.	Measuring performance is one difficult stage in many organisations. The flow of products and services is important. From experience performance measurement should be based on input and output.
		Summary of the transcribed data for sub - question 1 The first sub-question 1 was the confirmation of the adaptation of supply chain collaboration in the organisation and it was confirmed by the respondents that the collaboration is key element required for the success and sustainability of the organisation by pointing out the roles played such as connectivity of suppliers, customers satisfaction, goal alignment and continuous improvement for effective organisation operation.	**Summary of the transcribed data for sub - question 2** From the interviews, respondents all agreed that collaborative supply chain adopted information sharing, cost reduction, good leadership and effective communication can help improve performance of an organisation.	**Summary of the transcribed data for sub - question 3** The third sub-question was designed to bring out the how performance can be measured. The researcher was made to understand that there are different ways of measuring performance which include input and output, quality of products and services offered, financial flow and timeliness.

Data Transcribe and Interpretation for Rainoil on Question 2

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 2. What are the enablers of supply chain collaboration leading performance improvement in oil and gas industry?

No	Respondents	Question 1: What are the key enablers of supply chain collaboration in your organisation?	Question 2: How sustainable is the collaboration between you and your partners?	Question 3: Can supply chain performance be improved without collaboration? If yes, what are the alternatives?
1	MRAIN	Inclusive decision making is key to collaboration which means involving all partners in decision making. This is important in the effective performance of an organisation operation as it reduces risks and uncertainty, costs and enable effective flow of resources in the system which is prime for collaboration.	Ways to make effective collaboration with partners is build trust. It is important to keep level trust among parties especially with client and when relationships are effectively managed it can promote performance.	Yes, in as much as collaboration is important business can survive without it. The key elements that can improve an organisation performance are focus to meeting customers demand, strategic location, and value of the product.
2	MRAIN	Clear policies and open communication are our primary enablers in the business, but I must state clear that collaboration enablers differ from sections and department because what may work here may not work in another unit or department. Clear policies and communication can strengthen trust and transparency resulting to effective allocation of resources.	It is important to avoid complicated policy and we ensure to create relationship that can stand test of time. Organisation should try avoiding bureaucracy and ambiguous policy.	Yes, it is possible to improve business performance without collaboration especially an organisation operating a monopolistic business and the nature of environment. In this situation such organisation can improve its performance without partnership, but it is very difficult in a highly competitive environment to succeed without collaboration which is noticeable in the oil and gas sector.
3	MRAIN	Infrastructure and trust an organisation like ours need infrastructure and trust to enable efficient distribution of our product, order placement and receiving supplies.	For an organisation to sustain its collaboration with clients which depends on the effective management of relationship and trust. These are the key aspects to be consider superior in any partnership.	Collaboration is needed in the oil and gas industry, but other organisations can still improve its performance without partnering with another by focusing on its operation and doing what is needed and committed in delivery quality product timely to customers.
4	ERAIN	Before an organisation begin to talk of success there must be Internal and external alignment of objectives with clear policy with support effective operation. An organisation should develop a workable channel that are reliable such time management and communication.	Collaboration could last long if the parties involved are committed and dedicated for common decision making to enable transparency and accountability.	An organisation can improve its performance without collaboration when it applies work right and conduct business in friendly environment.
5	ERAIN	An organisation can successful operations hen there is tolerant in administrative affairs and effective costs management which ensure that resources are adequately allocated, and activities are well monitored.	Customers satisfaction and effective distribution of products to clients is our key strategy in collaboration.	An organisation should focus on developing its brand and doing thing right by continuously improving quality and having innovative mind

6	**ERAIN**	The key enabling factors for organisation success in its operation include financial strength and access to finance. An organisation can operation successfully if there is effective financial commitment and information sharing about happening in the system.	The success of collaboration in our organisation is evidence in the consistent supplier to our customers. This approach has been helpful to us especially in this period of Covid-19 pandemic.	Yes, effective planning is important because if an organisation did not plan its resources and have collaboration with partners therefore the performance will not improvement. Effective planning is the foundation for collaboration.
7	**ERAIN**	Infrastructural development, this is crucial because an organisation may have the best policies and plans but without good infrastructure the organisation can still face set back or delays in delivery of its goods and services as expected. Therefore, infrastructural development is needed for effective supply chain collaboration which will enable effective movement and distribution.	It is important to keep connected to clients and constantly an organisation to review its strategies to remain focus on quality management.	Yes, in fact a business can still improve its performance by acknowledging and understanding it strengths and weaknesses which is very important for performance improvement include clear communication of organisation vision and mission.
		Summary of the transcribed data for sub - question 1 From the transcribed data the researcher understand that the mention supply chain collaboration includes inclusive decision making, clear policies and communication, leadership quality, internal and external alignment of objectives, costs management, information and financial flows, and infrastructural development.	**Summary of the transcribed data for sub - question 2** This question makes the researcher to understand that there is success collaboration with partners which has been helping in the effective flows of resources in the organisation	**Summary of the transcribed data for sub - question 3** Most of the responses pointed out clearly that collaboration is important, but businesses can survive and improve performance through focus, commitment, research and development, monitoring, monopolistic operation and quality improvement and innovative mind.

Data Transcribe and Interpretation for Rainoil on Question 3

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 3. What are the inhibitors of supply chain performance in the oil and gas industry?

No	**Respondents**	**Question 1: What are the supply chain collaboration inhibitors which affect your organisational performance?**	**Question 2: How do you manage challenges in the supply chain collaboration which inhibit you from achieving the targeted goals?**	**Question 3: How does lack of collaboration affect your organisational performance?**

1	**MRAIN**	I cannot take out the impact of Covid-19 on operations. This has come into effect in different levels and stages which include lockdown, boarder closure, social distancing and restricted movement which affected both human and product movement result to scarcity.	Business is all about risk taking. Our organisation is determined to remain focus, consistent in our operations and committed in doing what work better for us again and again which is part of continues improvement.	Low performance, slow response to order and even possible delay in the system to Covid-19 impact resulted to new ways of operation and how to do business at local and international levels which was new and the difficulty of coping with it.
2	**MRAIN**	Demand and supply uncertainty make it difficult for suppliers to predict or anticipate customers' demand in advance due for example to changes in weather and preference.	Having a good market survey guide the operation our organisation and direct its activities which allows managers to plan effectively to meet the objectives of the company activities.	lack of manpower can affect collaboration in business especially in the oil and gas industry where actions are needed, decision making can be difficult in the system because collaboration help build unity of purpose, effective flow of information and promote standard and quality which without it could result to confusion.
3	**MRAIN**	Lack of quality and safety measures can also be a challenge, which implies that the operation and supply chain is affected due to a lack of control against fraud and adulteration of the products in the oil and gas industry.	Flexibility in our mode of operation permit us to collaborate effectively with our partners. Flexibility enables us to share sensitive information regarding business transactions. It is important that organisations allow flexibility in its information sharing as it helpful for the organisation activities and operation. In doing so provide transparency and accountability resulting to performance improvement	Poor transportation can lead slow productivity and inhibit response to demand and can be challenging to supplier as it tends to threat to their collaborative partner when dealing with urgency and dignity.
4	**ERAIN**	The lack of appropriate supply chain contracts results from inadequate and unclear policies and a poor regulatory framework in the working terms and conditions to enable efficient and secured information sharing has greatly impacted negatively on the supply chain activities in the oil and gas industry.	Effective communication is one of the strategies we employed in managing challenges. When communication is effectively administered in the conduct of an organisation activities it has several ways of impacting meaningfully to the performance of the organisation through control of resource, its allocation and effective decision making.	The organisation may find it difficult to achieve wider targets and goals that can lead to success. A lack of collaboration in a company will make it difficult to market the best ideas. Collaboration is so vital in the day to day running of an organisation as it provides the link between parties for mutual operation. it is right organisations align their goals and target in a collaborative manner to achieve desire outcome.

5	**ERAIN**	Infrastructure affects the efficient movement of oil and gas products from one point to another as a result of poor facilities to transfer products from the suppliers to the demand points in the best and safest way	Effective time management is the key for success. In very business time is vital for planning, decision making, allocation of resources timely is key and activity monitoring and evaluation.	In a situation where there is lack of collaborative in an organisation the staff become disengaged, set back in policy making, customer and partners lose trust and motivation of both parties become weak. the simple fact is that an organisation can succeed in its project when there is teamwork and avoiding taking huge risk.
6	**ERAIN**	Lack of cooperation and coordination have negative effects on the operation and supply chain management in the oil and gas industry when there is no close relation between parties and a lack of team work to facilitate decision making can lead failure of system.	The external and internal supply and distribution elements in Nigeria have complicated the operation of oil and gas industry with issues ranging from funding, transportation, and distribution of products. But our organisation is committed in focusing on good relationship management.	A lack of collaboration affects productivity of an organisation when there is unclear direction and no planning in place.
7	**ERAIN**	The complexity of market systems and infrastructure, such as inefficient procurement, transportation network and distribution channels in Nigeria affected supply chain collaboration	Dilapidated infrastructure in Nigeria and low private sector involvement in the whole supply chain in the Nigeria is a challenge. The Government of Nigeria should encourage and support private sector participation in the oil and gas industry.	Lack of collaboration affection innovation and creativity as organisation needed connectivity.
		Summary of the transcribed data for sub - question 1 From the transcribed data, the researcher understands that factors inhibiting supply chain collaboration include Covid-19 pandemic, information sharing, infrastructural development, decision making, unclear policies, communication, leadership quality, alignment of goals and objectives, financial flows, and relationship management and trust.	**Summary of the transcribed data for sub - question 2** From the transcribed data, the researcher understands that some of the approaches employed by managers and supervisors in managing challenges faced by the company include commitment, order placement, flexibility, effective communication, effective time management, transfer of skills, consistency, and relationship management.	**Summary of the transcribed data for sub - question 3** From the transcribed data, the researcher understand that a lack of collaboration can affect organisation performance as it discourages teamwork, decision making can be difficult, slow productivity, difficult to achieve organisational wider targets, organisation become disengaged, lack of connectivity to each other and resulting to poor communication.

Data Transcribe and Interpretation for Rainoil on Question 4

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 4 What other strategies you have employed in the implementation of supply chain collaboration?

Question 1: What other strategies you have employed in the implementation of supply chain collaboration?

No	Respondents	
1	MRAIN	Yes, I may agree to you that identified enablers are true, but it is vital that organisation adopt other strategies in its operation. Another key element to be considered in the system is to watch out for any possible risks and uncertainties that can hinder their performance
2	MRAIN	I agree with you, but it is important for an organisation to enforce good planning an effective communication in the systems of operation. On the account of strategies implemented our supply chain collaboration, our organisation creativity and efficient time management as part of good planning has been our main priority and it is our key enabler. In doing so we focus more internal development and when there is limited or non-availability time management, resources and infrastructural development then inhibit the performance of an organisation which all mentioned can only be achieved by effective planning
3	MRAIN	An organisation should be able to define and communicate its goals and objectives in clear terms in order to achieve the desire result. It is important to state clearly here that there are no accepted factors that are meant to be enablers and other as inhibitors. It works in way, if an organisation fails to effectively plan its operation it may become an inhibitor and if an organisation properly coordinates its activities it may act as enabler. Collaboration is an act of implementing what work well for you and that become your enabler because it facilitates your business connectivity. An organisation should adopt the use KPIs strategies to direct its conduct efficiently

4	**ERAIN**	It is difficult to set a standard of enablers for collaboration because what work well in business A may work the structure or system of business B. The key strategies here are that organisations should focus on building good relationship, remain committed to its operation and encourage creativity.
5	**ERAIN**	You presented some vital elements that can act as enablers and inhibitors to performance of an organisation, but I must add that it is important that companies share their mission over and over again. This element is important strategy for improving performance particularly during this period of Covid-19 pandemic.
6	**ERAIN**	Yes, the strategy to be considered away from the above mentioned include the promotion of a community working environment that able innovation and effective customer satisfaction. I strongly believe that this aspect should be considered integral in collaborative supply chain.
7	**ERAIN**	In my opinion it is important for organisation to highlight its individual strength and remain committed in training and development of its employees as strategy for achieving needed success

Summary of the Transcribed Data for question 4
The respondents interviewed expressed their understanding of the already identified factors which could be enablers and inhibitors of supply chain collaboration and they pointed out some novel strategies to supply chain collaboration which include communication of company's expectations, foster honest and open communication, define, and communicate organisation goals and objectives, build relationship, share organisation mission, community working environment and review of individual strength.

Appendix C.4A A Rano Views

Data Transcribe and Interpretation for AARano on Question 1

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 1. How can supply chain collaboration improve performance in the oil and gas industry?

No	**Respondents**	**Question 1: Have supply chain collaboration been fully adopted in the oil and gas industry in Nigeria? If yes, how?**	**Question 2: Do you think the collaborative supply chain's adoption will help improve performance in the oil and gas industry in Nigeria?**	**Question 3: How can you measure performance in the oil and gas sector?**

	MRANO	Yes, For the sustainability of our operation in this oil and gas industry collaboration is highly needed with both our customers and suppliers. The organisation valued its relationship with partners and try its best to close any gap that could be found in chains of operations by creating trust and good relationship for effective delivery and satisfaction.	Yes, based on my experience I think supply chain collaboration is beneficial to our organisation performance in terms of efficiency, cost reduction and shortened lead-time in the delivery and distribution of oil and gas products.	In my opinion, performance can be measured in two ways which include internal and external. From the view of the internal operation of our company it is important to keep an eye on quality product distribution and effective customer satisfaction, which is more of good planning, while from the external viewpoint of external measures our organisation try as much to ensure flexibility, timeliness and good relationship with suppliers and customers for efficient allocation of resources and responsiveness.
2	**MRANO**	Yes	Yes, it is important to recognise that performance of every organisation should be strategic, and self-directed and adopting collaboration may help in improving so many things.	Based on my experience, performance can be measured by setting up KPIs and they are reviewed annually for effective improvement if there is need. The KPIs that are much important to our operation include consistent supplies, lead time and quality management.
3	**MRANO**	Yes, it has been adopted and this is eminent in our operations.	Yes.	I think the important strategies employed for performance measurement should be based on input and output.
4	**ERANO**	Yes, it is having been adopted and our organisation was one of the first to implement collaboration in Nigerian oil and gas sector because we are the major company oil and gas distribution. It was necessary for us to set the pace for other to follow and it is paying off.	Yes, but I want you to what is supply chain collaboration first, this typically means organisations working together in the supply chain, sharing objectives, and focusing on costs reduction. These brief strategies if managed well can improve customer service and the supply chain performance to some extent.	The overall measures should be focus on achieving the organisation objectives, consistency, and sustainability.
5	**ERANO**	Yes, it has been fully adopted and it is working for relationship creation and ensure orderly conduct of business activities. It also facilitates the teamwork and stability of our organisation performance.	I think it is a sure way for performance improvement and business sustainability	an organisation can achieve it desire result when there is good leadership in place to direct its activities by implementing good policies and managing it effectively.

6	**ERANO**	Yes, it has been fully adopted	Yes, it has been helping our organisation to overcome strike by keeping consistent supply which can be achieved by good leadership resulting to teamwork and clear policies on issues.	Performance is a difficult thing to be measured because it involves many challenging steps, but our organisation is trying. We normally conduct quarterly review on policy, financial flows, and relationship with partners.
7	**ERANO**	Yes, it has been adopted	Yes, supply chain collaboration is very important tool in the success of an organisation, there is a saying that a tree cannot make a forest.	My understanding it difficult to measure performance but largely depends on the level of organisational success or achievements.
		Summary of the transcribed data for sub - question 1 The first sub-question 1 was the confirmation of the fully implementation of supply chain collaboration in the organisation and it was confirmed by the respondents that the collaboration is key element required for the success and sustainability of the organisation by pointing out the roles played such as connectivity of suppliers, customers, and their organisation for effective operation.	**Summary of the transcribed data for sub - question 2** From the interviews, respondents all agreed that collaborative supply chain adopted can help in performance in their organisation through information sharing, cost reduction, good leadership and enhance knowledge.	**Summary of the transcribed data for sub - question 3** The third sub-question was designed to bring out the how performance can be measured. The researcher was made to understand that there are different ways of measuring performance which include internal and external measures, input and output, flexibility, and timeliness.

Data Transcribe and Interpretation for AARano on Question 2

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.

Subsection Question: 2. What are the enablers of supply chain collaboration leading performance improvement in oil and gas industry?

No	**Respondents**	**Question 1: What are the key enablers of supply chain collaboration in your organisation?**	**Question 2: How sustainable is the collaboration between you and your partners?**	**Question 3: Can supply chain performance be improved without collaboration? If yes, what are the alternatives?**

1	**MRANO**	My view could be cantered on inclusive decision making, which means involving all partners in decision making.	If components are effectively managed there will be evidence of collaboration.	The key elements that can improve an organisation performance are focus to meeting customers demand, strategic location, and value of the product.
2	**MRANO**	Clear policies and communication are our primary enablers in the business	It is important to avoid complicated policy and we ensure to create relationship that can stand test of time.	Yes, it is possible to improve business performance without collaboration especially an organisation operating a monopolistic business and the nature of environment. In this situation such organisation can improve its performance without partnership, but it is very difficult in a highly competitive environment.
3	**MRANO**	A good leader tries to implement what will lead to success of the organisation and always looking for effective channels of partners with credible suppliers for consistent supplies.	Our collaboration with partners rest on the effective management of relationship and trust.	continuous improvement of product and services through innovation and creativity.
4	**ERANO**	Goals alignment objectives should be very clear.	Takes into account transparency and accountability leading to sustainability.	Collaboration is just one of several aspect to improving an organisation performance and organisations can improve their performance without collaboration by doing what is right and coordinating business activities justly.
5	**ERANO**	Effective decision making be considered to be a recipe needed for the conduct of an organisation activities and our organisation takes this point very serious and has been helping us to overcome management issues.	Our collaboration with partners has been successful in so many areas as evidence in the consistent distribution and customers satisfaction.	Development of self-confidence and commitment
6	**ERANO**	Information and financial flows.	I have been involved in the monitoring and distribution of our products and I discover the importance of collaboration as culture of organisations differs therefore partnership is needed to balance operation. The success of collaboration in our organisation is evidence in the consistent supplier to our customers.	Yes, effective planning is important because if an organisation did not plan its resources and have collaboration with partners therefore the performance will not improvement. Effective planning is the foundation for collaboration.

7	**ERANO**	Channel of communication in an inhibitor we are facing. I as a supervisor I can tell you that the effective channel we reach out customers and other business associate is by phone or text message. However, the challenge is that most areas in Nigeria experience poor network services such MTN, Glo and Airtel network connectivity in some cities making it difficult communicate effective when issue urgent business opportunities arise.	It is very important that organisations understand that managing relationship is crucial for the success of the organisation operations. We at our level, our organisation prioritised relationship management which is key is teamwork management, build creditability and respect to customers and partners.	This has greater influence on any organisation performance. It can impact negatively to the performance of an organisation when there is poor communication in the system. Collaboration cannot be successful without effective communication.

Summary of the transcribed data for sub - question 1	**Summary of the transcribed data for sub - question 2**	**Summary of the transcribed data for sub - question 3**
From the transcribed data the researcher understand that the mention supply chain collaboration includes inclusive decision making, clear policies and communication, leadership quality, internal and external alignment of objectives, costs management, information and financial flows, and infrastructural development.	This question makes the researcher to understand that there is success collaboration with partners which has been helping in the effective flows of resources in the organisation	Most of the responses pointed out clearly that collaboration is important, but businesses can survive and improve performance through focus, commitment, research and development, monitoring, monopolistic operation, and strategic location.

Data Transcribe and Interpretation for AARano on Question 3

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 3. What are the inhibitors of supply chain performance in the oil and gas industry?

No	**Respondents**	**Question 1: What are the supply chain collaboration inhibitors which affect your organisational performance?**	**Question 2: How do you manage challenges in the supply chain collaboration which inhibit you from achieving the targeted goals?**	**Question 3: How does lack of collaboration affect your organisational performance?**

1	**MRANO**	We have seen and noticed the negative impact of Covid-19 on our business operation, and I can say that restricted movement has affected our collaboration with our partners as it presents a threat and danger to operations due to lack of information and material flow.	There is no easy way in business, therefore our organisation is determined to remain focus, consistent in our operations and committed in doing what work better for us again and again which is part of continues improvement.	Please get me right here, there are still companies that are operating independently without collaborating and they are doing well, but it better for organisations to collaborate with each other by sharing information that will promote unity of purpose. A lack of collaboration can affect organisation performance and discourages teamwork, lose trust and motivation of staff.
2	**MRANO**	The key inhibitor of supply collaboration in our organisation and the nation at large is a lack of innovation and creativity. there is need for an organisation to have innovative and creative mind which means developing something new or constantly improving the existing one. when there is no improvement into the system such as staff training and development the organisation will short of ideas and out of operation sooner or later.	Order placement is an integral part of managing business. When order placement is well managed it makes our organisation to better position its operation to achieve desire success and be able compete. Order placement is crucial in collaboration as it enable suppliers to deliver on commitment effectively and efficiently. Emergency or late buying are difficult to manage therefore organisations should cultivate the culture of placing order on time.	there should be need for effective flow of materials and information.
3	**MRANO**	The covid-19 have taken our joy and there is no free interaction among members, this have made people to so reserved to themselves and this is impacting negatively to our decision-making process. Most staff are afraid of coming so that they can contracted the virus. Dispute the use of online meeting, many managers and employees would find it difficult to connect due to poor internet connection in their respective areas leading to imbalance or delay in decision making and the apply to every process of our operation.	It is important for every organisation allow flexibility in its activities which provide transparency that result to performance improvement.	Slow productivity and response to demand can be challenging as supplier tend to treat their collaborative partner with urgency and dignity.
4	**ERANO**	I have been working in the operation unit of the company for several years now and the prominent inhibitors in the supply chain collaboration include lack of alignment of goals because companies in collaboration sometimes never have same ideology making it very difficult to align them.	we at our own level promote trust and high level of communication for both internal and external dealings.	collaboration should be the key pilar to successful operation of any meaningful organisation.

5	**ERANO**	It is important for organisations to understand that timely collaboration, suppliers' selection, and decision making is key to overcoming business barriers.	Goal align is important to me and we promote it here a lot.	In a situation where there is lack of collaborative in an organisation the staff become disengaged, set back in policy making, customer and partners lose trust and motivation of both parties become weak. the simple fact is that an organisation can succeed in its project when there is teamwork and avoiding taking huge risk.
6	**ERANO**	In most case mode of offering services and design of operation contributed to the major challenges faced by organisation.	Transfer of skills and training is another area I will suggest being the best approach in managing challenges. As a supervisor in the field of operations and logistics of the company, I can tell that skills transfer help me and other managers to relate with our fellow co-workers and has helped us to deal with our subordinates, customers and partners which allows for smooth flow of activities in our organisation.	Lack of collaboration can lead to confusion, distraction, and infective operation.
7	**ERANO**	let me will still emphasis on the impact of Covid-19 as inhibiting factor to our operation. Relationship with our partners were greatly affected due to the boarder closure and trust was very difficult to managed as parties in the collaboration were informed as it should, and we need to understand that collaboration will not be effective without effective and efficient flow of information and materials in the chain. Our organisation currently witnessing challenges with our international collaborators as there is lack of flows in the system.	Sincerely your questions are somehow challenging to me, but I must be put it to you that managing challenges is not as easy as you may think but an organisation must maintain consistency in its policy and commitment to ensure that the organisation goals are achieved.	Lack of collaboration affection innovation and creativity as organisation needed connectivity, information sharing and effective communication to be able the achieve the required performance. So a lack of collaboration even the organisation employees, customers and partners may not be aware of happenings in the organisation as there is limited ideas and understanding which affect creativity and innovative mind.
		Summary of the transcribed data for sub - question 1 From the transcribed data, the researcher understands that factors inhibiting supply chain collaboration include Covid-19 pandemic, information sharing, infrastructural development, decision making, unclear policies, communication, leadership quality, alignment of goals and objectives, financial flows, and relationship management and trust.	**Summary of the transcribed data for sub - question 2** From the transcribed data, the researcher understands that some of the approaches employed by managers and supervisors in managing challenges faced by the company include building trust, order, flexibility, effective information sharing, effective time management, transfer of skills, consistency, and relationship management.	**Summary of the transcribed data for sub - question 3** From the transcribed data, the researcher understand that a lack of collaboration can affect organisation performance as it discourages teamwork, decision making can be difficult, slow productivity, difficult to achieve organisational wider targets, organisation become disengaged, lack of connectivity to each other and resulting to poor communication.

Data Transcribe and Interpretation for AARano on Question 4

Topic: The Adoption of Supply Chain Collaboration in Oil and Gas Industry: A Case of Performance Improvement in Nigeria.
Subsection Question: 4 What other strategies you have employed in the implementation of supply chain collaboration?

Question 1: What other strategies you have employed in the implementation of supply chain collaboration?

No	Respondents	
1	MRANO	Yes, the mentioned enablers are supportive components of supply chain, but it is important to understand the roles of other strategies such as avoidance of unnecessary expenses in the conduct of supply chain activities. Organisations should develop plans that will guide their conduct and direct operational activities through costs reduction".
2	**MRANO**	Organisations should be committed to making effective decisions that will drive the operations and supply chain to the path of success. This can be achieved through strong decision-making skills which is crucial in the risk assessment of decisions and encourage members participation.
3	**MRANO**	I agreed with your mentioned points from the literature, but I will wish to add that many organisations don't know what collaboration is, they believe that it is all about coming together but collaboration can be successful where there is trust, commitment and transparency in policies and process. Organisation should employ honesty as a strategy to customers satisfaction and accountability in the system
4	**ERANO**	I can agree with you that the identified factors are capable of enabling collaboration of organisation. Our other strategies focus on training, promotion of business ideas.

5	**ERANO**	Yes, but is crucial to note the environment you are operating on and what type of relationships you keep with partners.
6	**ERANO**	Yes, you can see we are doing because we invest much into human developed through training and programmes for new ideas for the benefit of our organisation.
7	**ERANO**	Yes, but it is important that we as organisation think strategically about our business strategies.

Summary of the Transcribed Data for question 4

The respondents interviewed expressed their understanding of the already identified factors which could be enablers and inhibitors of supply chain collaboration and they were able to point out some novel strategies such as training and business ideas.

Appendix D Interview Findings Percentage Despondence Frequency

Interview Findings Percentage Despondence Frequency

Interview Findings Percentage Despondence Frequency on Question 1

How can supply chain collaboration improve performance in the oil and gas industry?

Adoption	**Number of respondents and their Frequency**			
	Managers	**Employees**	**Total**	**%**
Trust	6	7	13	43%
Goal Alignment	1	0	1	3%
Good Relationship	1	1	2	7%
Flexibility	6	3	9	30%
Effective Time Management	6	3	9	30%
Information Sharing	10	4	14	47%
Connectivity of Suppliers	2	3	5	17%
Input and Output Management	1	1	2	7%
Customers' Satisfaction	3	2	5	17%
Costs Reduction	2	2	4	13%
Performance Management	1	1	2	7%
Teamwork	1	3	4	13%
Good Leadership	1	4	5	17%
Effective Operations	1	4	5	17%
Decision Making	1	3	4	13%
Total Interviewees			30	

Interview Findings Percentage Despondence Frequency on Question 2

What are the enablers of supply chain collaboration leading performance improvement in oil and gas industry?

Enablers	**Number of respondents and their Frequency**			
	Managers	**Employees**	**Total**	**Percent**

Teamwork	1	4	5	17%
Policy Making	0	4	4	13%
Key Performance Indicators	0	2	2	7%
Good Leaderships	5	2	7	23%
Trust	5	7	12	40%
Collaborative Relationship Management	4	9	13	43%
Target and Goal Alignment	2	6	8	27%
Effective Flow of Resources	3	3	6	20%
Timeliness	3	5	8	27%
Good Planning	2	3	5	17%
Decision Making	1	5	6	20%
Quality Management	2	2	4	13%
Continuous Improvement	2	7	9	30%
Effective Communication	4	9	13	43%
Communication Channels	3	4	7	23%
Information Technology	3	1	4	13%
Infrastructure	1	1	2	7%
Information Sharing	2	5	7	23%
Road Network	2	3	5	17%
Financial Flow	3	4	7	23%
Cost Management	0	4	4	13%
Effective Commitment	0	6	6	20%
	48	96	144	

total Participants 30

Interview Findings Percentage Despondence Frequency on Question 3

What are the inhibitors of supply chain performance in the oil and gas industry?

Inhibitors	**Number of respondents and their Frequency**			
	Number of respondents			
	Managers	**Employees**	**Total**	**%**
Covid-19 pandemic	10	17	27	90%
Lack of Security	2	5	7	23%
Poor Transports System	2	2	4	13%
Poor Communication	8	3	11	37%
Lack of Clear Policies	7	2	9	30%
Lack of Working Capital	3	1	4	13%
Lack of Manpower	2	3	5	17%
Lack of Commitment	1	3	4	13%
Lack of Innovation and creativity	1	1	2	7%
Lack of Information Sharing	1	3	4	13%
Order Placement	3	1	4	13%
Poor Planning	0	2	2	7%
total Participants				30

Interview Findings Percentage Despondence Frequency on Question

What other strategies you have employed in the implementation of supply chain collaboration

Other Strategies	**Number of respondents and their Frequency**			
	Number of respondents			
	Managers	**Employees**	**Total**	**%**
Key Performance Indicators	1	5	6	20%
Monitoring and Evaluation	1	6	7	23%
Management of Business Structure	1	4	5	17%
Good Planning	3	9	12	40%
Honesty	2	2	4	13%
Effective Communication	2	4	6	20%

Internal Development	1	3	4	13%
Effective Decision Making	1	3	4	13%
Value Creation	1	3	4	13%
Avoid Risk Taking	1	2	3	10%
Unnecessary Expenditures	1	2	3	10%
Review of Performance	1	2	3	10%
total Participants				30

Appendix E Interview Findings Validation

Data Validation

Question 1: What is performance improvement?

Performance improvement is the alignment of the sector's activities by the staff working together to achieve the desired outcome.

Question 2: What are key enablers to performance improvement in supply chain?

Relationship Management, Infrastructure, Planning and Quality Management.

Question 3: What are the inhibitors to performance improvement in supply chain?

Covid 19, Lack of Infrastructure and Poor leadership

Data Validation

Question 1: What is performance improvement?

Performance improvement is a process of measuring the evidence of increased efficiency or output as a result of the adjustments or changes made to a specific job, methodology, or work instruction.

Question 2: What are key enablers to performance improvement in supply chain?

performance improvements are enabled by access to databases of information, capabilities for data analysis, and full access to data sharing or networking. As more data becomes available, supply chains are given leverage to do better decisions whether the aim is for economic gains or for sustainability. Some companies have access to all the data though but are not necessarily more improved because they may not have the appropriate skills for data analysis. Correct use of available data whether full blown or limited is still a more enabling asset to a company.

Question 3: What are the inhibitors to performance improvement in supply chain?

The possible inhibitors of performance improvement can be unrealistic expectations or under-used resources. The 7 types of wastes from TPM can be applied to this as well. Supply chains should be able to measure the main sources of performance wastes for example overproduction, unmonitored inventory, defects, motion, over-processing, unnecessary waiting, transport, and underused talents in the organizations. If these sources of waste are not measured, improvements are also unlikely.

Data Validation

Question 1: What is performance improvement?

Performance improvement is measuring the output of a particular business process or procedure, then modifying the process or procedure to increase the output, increase efficiency, or increase the effectiveness of the process or procedure. Improving performance in manufacturing and servicing is the basic objective of modern operations management approaches, although several approaches and techniques have proved their usefulness and have boosted efficiency dramatically. Organizations cannot effectively implement advanced workplace strategies and investment projects without clearly improving in their performance by prioritized objectives and appropriate.

Question 2: What are key enablers to performance improvement in supply chain?

Alignment of Goals,
Team work,
Performance improvement,
Relationship Management,
Timeliness and order planing,
Quality Management,
Infrastructure,
Good planing,
Process monitoring,
Training,
Business strategy
and Finance

Question 3: What are the inhibitors to performance improvement in supply chain?

Covid-19
Poor leadership,
Finance,
Teamwork,
Infrastructure,
Relationship management

Data Validation

Question 1: What is performance improvement?

Performance improvement is the measure of development in terms of the efficiency or output or reduction of defects or wastes as a result of adjustments done in the methodologies, processes, or process flows.

Question 2: What are key enablers to performance improvement in supply chain?

Key enablers of performance improvement would be Quality Management, Planning, and Infrastructure. Quality management would target the improvement or reduction of defects, while improvement in planning would reduce wastes on processing and use of resources. The infrastructure changes would also give performance improvement when designed to allow access to databases for example, where supply chains can network and share knowledge critical to decisions that would support their respective objectives.

Question 3: What are the inhibitors to performance improvement in supply chain?

Infrastructure not conducive to collaboration, major disruptions such as Covid19, and poor leadership where employees are not empowered to contribute to innovative ideas or supported in coming up with process development schemes.

https://docs.google.com/forms/d/1icEqKZPGdr9KKpy6zjiE5qNDHWXp0hrXIS8mQL9du1I/edit#response=ACYDBNgJBwPOthR7RtWs2OBvSQ…

Appendix F Research Model Validation

Model Validation

Question 1 Can you confirm how this model can lead to lead to performance in supply chain

Agreed. Since, Supply chain key enablers specifically focused on supply chain's activities in meeting end-customer requirements by increase an organization's operational performance through flexibility, reduced lead time, cost saving, resource planning, reduced inventory level and capacity, on time delivery in a responsive manner.

Question 2 Are the identified elements in the model capable for any organisational improvement.

This is broadly cover six precise section in an organization. Therefore, it will be benefited for most of the organization utilizing in a proactive manner.

Model Validation

Question 1 Can you confirm how this model can lead to lead to performance in supply chain

yes, with precise process monitoring, strategies, training and good planing together with supply chain collaboration ensures for enhancement in operational and financial and non-financial performance improvement in supply chain

Question 2 Are the identified elements in the model capable for any organisational improvement.

No, Since that model specifically design for oil and gas industry, it will be effective for such industry categories.

Appendix G Interview Findings and Research Model Data Transcribe

Question 1	Managers Answers/Outcomes	Summary
What is performance improvement?	1. Performance improvement is the alignment of the sector's activities by the staff working together to achieve the desired outcome.	This question was basic to validate the understanding of the respondents of what they really know about performance improvement in general. It was conformed that the selected respondents have good ideas of performance management and how to improve following it. they identified staps such as aligning desire, increasing efficiency and due process should be adopted by organisation to be on top of their game.
	2. Performance improvement is a process of measuring the evidence of increased efficiency or output as a result of the adjustments or changes made to a specific job, methodology, or work instruction.	
	3. Performance improvement is measuring the output of a particular business process or procedure, then modifying the process or procedure to increase the output, increase efficiency, or increase the effectiveness of the process or procedure. Improving performance in manufacturing and servicing is the basic objective of modern operations management approaches, although several approaches and techniques have proved their usefulness and have boosted efficiency dramatically. Organizations cannot effectively implement advanced workplace strategies and investment projects without clearly improving in their performance by prioritized objectives and appropriate.	
	4. Performance improvement is the measure of development in terms of the efficiency or output or reduction of defects or wastes as a result of adjustments done in the methodologies, processes, or process flows.	
	5. Performance improvement will be ensuring organization development which mainly focused on increasing overall outcomes by enhancing the efficiency and effectiveness of a particular process, function, or procedure.	
	6. Performance improvement will be ensuring organization development which mainly focused on increasing overall outcomes by enhancing the efficiency and effectiveness of a particular process, function, or procedure.	

Question 2	Managers Answers/Outcomes	Summary
What are key enablers to performance improvement in the oil and gas supply chain?	1. Relationship Management, Infrastructure, Planning and Quality Management.	This question was specific to confirm the key elements that can enable supply chain collaboration leading to improvement in the oil and gas industry and it was confirmed that in order to achieve the effective improvement the identified enablers should be taken into account seriously and implemented. The respondents were also pleased with the quality and the pattern to which the study enablers were generated.
	2. performance improvements are enabled by access to databases of information, capabilities for data analysis, and full access to data sharing or networking. As more data becomes available, supply chains are given leverage to do better decisions whether the aim is for economic gains or for sustainability. Some companies have access to all the data though but are not necessarily more improved because they may not have the appropriate skills for data analysis. Correct use of available data whether full blown or limited is still a more enabling asset to a company.	
	3. Alignment of Goals, Teamwork, Performance improvement, Relationship Management, Timeliness, and order planning, Quality Management, Infrastructure, good planning, Process monitoring, Training, Business strategy and Finance.	
	4. Key enablers of performance improvement would be Quality Management, Planning, and Infrastructure. Quality management would target the improvement or reduction of defects, while improvement in planning would reduce wastes on processing and use of resources. The infrastructure changes would also give performance improvement when designed to allow access to databases for example, where supply chains can network and share knowledge critical to decisions that would support their respective objectives.	
	5. Organizational Structure-This is providing a systematic approach to achieved certain activities in an organization's objectives. For example: Rules & regulations, responsibilities.	

	Internal relation behaviour- This is enhancing organizational process by developing a cross-functional relationship. For example: joint problem-solving strategies Customer Relational behaviour- Customer engagement is critical in fostering the development and maintenance of customer connections in a firm by boosting revenue growth as well as customer interactions generate shareholder alignment. Top Management support-In supply chain management, senior management support and dedication are decisive. Supply chain management relies heavily on managerial commitment. This is because it enables the company to reach breakthroughs in teamwork and client response. Information sharing-information sharing is critical since it allows for the interchange of data. In addition, it assists on actions related to company and supply chain strategy with information. Business performance measuring system-In business, a performance management system is a system that measures corporate performance and then influences employees to make changes. Employees have been observed working in accordance with the company's incentives. As a result, performance management systems are still necessary for providing the appropriate incentives to influence employee behaviour and Shareholder goals must be effectively integrated with performance management systems.	
	6. According to this model key enablers are alignment of goals, teamwork, performance improvement, relationship management, timeliness and order planning, quality management, infrastructure, and finance.	

Question 3	Managers' Answers/Outcomes	Summary

What are the inhibitors to performance improvement in the oil and gas supply chain?	1. Covid 19, Lack of Infrastructure and Poor leadership.	The question was directed to understand the key inhibitors of supply chain collaboration leading to performance improvement in the oil and gas industry. The respondents confirmed with the identified findings of the study and suggested that if inhibitors are properly managed will in turn be enablers that will facilitate performance improvement.
	2. The possible inhibitors of performance improvement can be unrealistic expectations or under-used resources. The 7 types of wastes from TPM can be applied to this as well. Supply chains should be able to measure the main sources of performance wastes for example overproduction, unmonitored inventory, defects, motion, over-processing, unnecessary waiting, transport, and underused talents in the organizations. If these sources of waste are not measured, improvements are also unlikely.	
	3. Covid-19, Poor leadership, Finance, Teamwork, Infrastructure, Relationship management.	
	4. Infrastructure not conducive to collaboration, major disruptions such as Covid19, and poor leadership where employees are not empowered to contribute to innovative ideas or supported in coming up with process development schemes.	
	5. Uncertainty in marketplace. For Example: Due to Russia invasion in Ukraine increase in fuel and raw material prices. Rapid technology innovation. For example: Industry 4.0 (IOT, robotics, block chain, autonomous robots etc.) Continuous amendments in Environmental protocols and natural disaster. For example: in 2021 world largest container vessel blockage in Suze canal caused significant disruption in supply chains. Cross-border trade regulation. For example: Leaving for Brexit UK in huge trouble for free trade at present. Geopolitical instability and cyber- attacks.	
	6. There are Covid-19, infrastructural development, poor leadership.	

Question 4	Managers' Answers/Outcomes	Summary
Can you confirm how this model can lead to performance in the oil and gas supply chain?	1. The model captures the enablers and inhibitors of performance improvement in SC, which enables the organisation to develop the right business strategy, monitor processes in the supply chain, plan to achieve improvement and provide the proper training for the effective supply chain management.	The model is developed in a way that capture all the vital aspects about performance improvement. It clearly presented the stages from supply chain system, supply chain collaboration process to other strategies leading to effective performance system.
	2. The model of measuring performance improvements as it applies to supply chains can further improve overall business performance by identifying the key contributors to business economic losses. Operations performance engineers or industrial engineers use the Pareto principle to zero down on the highest (top 20%) contributors of losses, breakdowns, inefficiencies, outputs, etc., and gather task forces to work on said performance problems. After applying the corrective actions, they then monitor if indeed the corrections result in improved performance. Prioritizing the ones with the greatest impact also refocuses the use of resources.	
	3. Going through No 5 question, if all the models are able to work together it will lead to performance in supply chain.	
	4. The capability of an organization to assess its current status and performance level is the foundation for improvement. Only then can they be made aware of when and where changes are required. Then a mechanism for monitoring or feedback is necessary for the organization to measure if changes are contributing to the desired development areas. Business strategy involves setting the goals and objectives of the company which leaders want to drive it towards. Once known, directions for improvement are better focused and resources are used more intelligently. Training and planning enable the organization to perform better with employees having the	

	required competencies, and use of resources are well planned.	
	5. Agreed. Since, Supply chain key enablers specifically focused on supply chain's activities in meeting end-customer requirements by increase an organization's operational performance through flexibility, reduced lead time, cost saving, resource planning, reduced inventory level and capacity, on time delivery in a responsive manner.	
	6. Yes, with precise process monitoring, strategies, training, and good planning together with supply chain collaboration ensures for enhancement in operational and financial and non-financial performance improvement in supply chain	

Question 5	Managers' Answers/Outcomes	Summary
Are the identified elements in the model capable for any oil and gas supply chain organisational improvement?	1. All the elements are critical for organisational improvement; however, the modus operandi would depend on the industry.	This question was design to validate the originality of the elements in the model been capable to deliver the intended outcomes. Respondents agreed with the elements identified in the model are sufficient and self-explanatory that shows the flow of what is required and making it easier for implementation.
	2. Yes. The same elements can be used in the organizational level of improvement as well. In organizational development works, the same principles apply: Assessing the current performance of the organization, then setting the objectives or the goals that the organization wants to achieve, and then having an organizational performance improvement plan. The capability to gather data and then analyse that information if it can be used to identify points of improvement.	
	3. Yes, they are capable of improving organizational improvement if all are put in place and level up that is, if we are able to work on the inhibitors it would definitely be capable to improve organization.	

	4. Elements such as Goal Alignment, Infrastructure, Quality Management, planning for business continuity process (for cases of unexpected disruptions), Mechanisms embedded in the system to monitor performance and pick up feedback, and coherent business strategy with clear objectives and vision would all help an organizational level of improvement. As they say, we cannot improve what we cannot measure, so the capability to measure performance is key. Then analysis of available data, employing correct leadership elements to drive improvements in all facets of the operations including managing quality, resources, optimizing resources such as talents (people), and closing the loop with planning, checking processes, and acting on what needs to be adjusted (PDCA model).	
	5. This is broadly covering six precise sections in an organization. Therefore, it will be benefited for most of the organization utilizing in a proactive manner.	
	6. No, since that model specifically design for oil and gas industry, it will be effective for such industry categories.	