

**UNIVERSITY OF EDUCATION, WINNEBA
SCHOOL OF BUSINESS
DEPARTMENT OF PROCUREMENT AND SUPPLY CHAIN
MANAGEMENT**

**LEVERAGING SUPPLY CHAIN VISIBILITY TO DRIVE CUSTOMER-
ORIENTED PERFORMANCE: THE ROLE OF SUPPLY CHAIN
COLLABORATION AND SUPPLY CHAIN LEARNING**

SAMUEL KWASI DANSO-AMOAKO



**MASTER OF BUSINESS ADMINISTRATION IN PROCUREMENT AND
SUPPLY CHAIN MANAGEMENT**

2024

**UNIVERSITY OF EDUCATION, WINNEBA
SCHOOL OF BUSINESS
DEPARTMENT OF PROCUREMENT AND SUPPLY CHAIN
MANAGEMENT**

**LEVERAGING SUPPLY CHAIN VISIBILITY TO DRIVE CUSTOMER-
ORIENTED PERFORMANCE: THE ROLE OF SUPPLY CHAIN
COLLABORATION AND SUPPLY CHAIN LEARNING.**

SAMUEL KWASI DANSO-AMOAKO

(7231740006)



**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF
PROCUREMENT AND SUPPLY CHAIN MANAGEMENT OF THE SCHOOL
OF BUSINESS, UNIVERSITY OF EDUCATION, WINEBA, IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF
MASTER OF BUSINESS ADMINISTRATION DEGREE IN
PROCUREMENT AND SUPPLY CHAIN MANAGEMENT**

SEPTEMBER, 2024

DECLARATION

Student's Declaration

I, **Samuel Kwasi Danso-Amoako**, hereby declare that this dissertation is the result of my original work towards the award of MBA in procurement and Supply Chain Management and that, to the best of my knowledge, it neither contains material published by another person nor materials which have been accepted for the award of any other degree of the University, except where due acknowledgments have been made in the text.

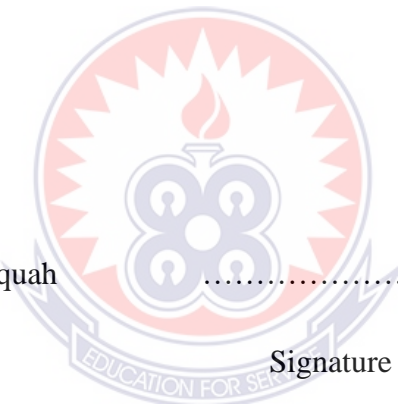
Signature:.....

Date:.....

Certified by:

Dr. Ishmael Nanaba Acquah

(Supervisor)



Signature

Date

DEDICATION

This work is dedicated to the memory of my beloved mother, Mrs. Grace Danso-Amoako Jnr. (Grace Acquahful), who passed away on 6th June, 2023. Her unwavering support, fervent prayers, and constant guidance were the pillars that sustained me throughout this journey. She was my biggest motivator, and her belief in my potential continues to inspire me every day.

I also dedicate this project to my immediate boss, Mr. Richard Sakyi, the Acting Head of the Procurement Unit at the Council for Scientific and Industrial Research - Oil Palm Research Institute, Kusi. Your leadership, encouragement, and understanding have been instrumental in helping me balance my professional responsibilities with my academic pursuits.

Lastly, I extend my heartfelt gratitude to Miss Mary Otema Kwarteng, a close and supportive friend who stood by me during the most challenging times of my studies. Your support, empathy, and friendship have been invaluable, and I am deeply thankful for your presence in my life.

To all of you, this work is a testament to your unwavering faith in me and your enduring support.

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my research supervisor, Dr. Ishmael Nanaba Acquah, whose guidance, support, and expertise have been invaluable throughout this project. His insightful feedback and encouragement have greatly contributed to the successful completion of this research.

I am also grateful to all the lecturers and staff at the University of Education, Winneba, School of Business, for their support and for providing an enriching learning environment. Your dedication to excellence in education has inspired me throughout my MBA journey.

Thank you to my family, friends, and colleagues for their constant support and encouragement. Your belief in me has been a source of strength and motivation.

Finally, I acknowledge the support of the Council for Scientific and Industrial Research - Oil Palm Research Institute, Kusi, particularly the Procurement Unit, for their assistance and cooperation during the course of my research.

ABSTRACT

The study examines the impact of supply chain visibility on customer-oriented performance in Ghana's manufacturing firms, focusing on the roles of supply chain collaboration and supply chain learning. The Resource-Based View (RBV) theory and the Organizational Learning Theory (OLT) guide the research. RBV posits that firms gain competitive advantage through unique resources, such as supply chain visibility, enabling them to effectively meet customer needs. OLT emphasizes that organizations that foster learning from supply chain activities are better equipped to adapt and improve performance. The study adopts a quantitative research approach, utilizing structured questionnaires to collect data from 152 manufacturing firms in the Greater Accra region. The data were analyzed using partial least squares structural equation modeling (PLS-SEM) to assess the relationships between supply chain visibility, collaboration, learning, and customer-oriented performance. The findings show that supply chain visibility positively affects customer-oriented performance, particularly when mediated by collaboration. Firms that engage in supply chain collaboration can leverage real-time visibility to improve customer satisfaction, product quality, and delivery timelines. Moreover, supply chain learning plays a moderating role, enhancing firms' ability to use supply chain visibility effectively to adapt to market dynamics and customer needs. The study recommends that manufacturing firms enhance supply chain visibility through technological investments and foster collaborative relationships with their supply chain partners. Additionally, firms should encourage continuous learning within their supply chains to optimize customer-oriented performance. Policymakers should create frameworks that promote collaboration and learning in supply chain networks to drive competitiveness in the manufacturing sector.

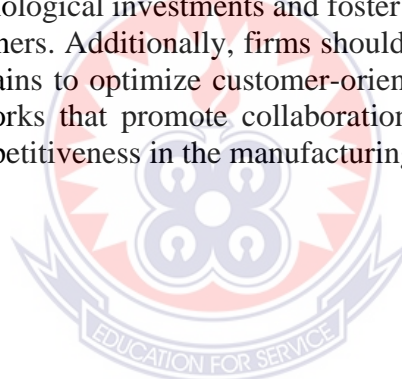


TABLE OF CONTENT

Content	Page
DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
TABLE OF CONTENT	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
CHAPTER ONE: INTRODUCTION	1
1.0 Background of the Study	1
1.1 Statement of the Problem	5
1.2 Purpose of the Study	7
1.3 Research Objectives	8
1.4 Research Questions	8
1.5 Significance of the Study	8
1.6 Scope of the Study	10
1.7 Organisation of the Study	10
CHAPTER TWO: LITERATURE REVIEW	12
2.0 Introduction	12
2.1 Conceptual Review	12
Supply Chain Collaboration	14
2.2 Theoretical Review	18
2.3 Empirical Review	23
2.4 Conceptual Framework and Hypothesis Development	33
2.4.1 Supply Chain Visibility and Customer Oriented Performance	33
2.4.2 Supply Chain Visibility and Supply Chain Collaboration	35
2.4.3 Supply Chain Collaboration and Customer Oriented Performance	36
2.4.4 Mediating Role of Supply Chain Collaboration	37
2.4.5 Moderating Role of Supply Chain Learning	38
2.5 Chapter Summary	39

CHAPTER THREE: RESEARCH METHOD	40
3.0 Introduction	40
3.1 Research Paradigm	40
3.2 Research Design	41
3.3 Research Approach	42
3.4 Study Area	43
3.5 Population	44
3.6 Sample and Sampling Procedure	45
3.7 Time Horizon	46
3.8 Data Collection Instrument	47
3.9 Variable and Measurement	48
3.10 Reliability and Validity	48
3.11 Data Collection Procedures	49
3.12 Data Processing Tools	50
3.13 Data Processing and Data Analysis	51
3.14 Ethical Consideration	52
3.15 Chapter Summary	52
CHAPTER FOUR: RESULTS AND DISCUSSION	54
4.0 Introduction	54
4.1 Response Rate	54
4.2 Demographics Characteristics of the Sample	54
4.3 Descriptive Statistics of the Constructs	56
4.4 Measurement Model Specification	60
4.5 Measurement Model Assessment	61
4.6 Internal Consistency Reliability and Convergent Validity Assessment	61
4.7 Discriminant Validity Assessment	64
4.8 Structural Model Assessment	65
4.9 Collinearity Assessment	66
4.10 Coefficient of Determination (R^2)	67
4.11 Effect Size (F^2) Assessment	68
4.12 Predictive Relevance (Q^2) Assessment	70
4.13 Assessment of Path Coefficients and Significance Level	71
4.14 Slope Analysis	74
4.15 Discussion of Results	76

Objective 2: Supply chain visibility on supply chain collaboration.	77
Chapter Summary	83
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	85
5.0 Introduction	85
5.1 Summary of Findings	85
5.2 Conclusion	87
5.3 Managerial Implication	88
5.4 Theoretical Implication	89
5.5 Contribution to Knowledge	90
5.6 Recommendations for Future Research s	91
REFERENCES	93
APPENDIX	105



LIST OF ACRONYMS

SCM	Supply Chain Management
PLS-SEM	Partial Least Squares Structural Equation Modeling
SPSS	Statistical Package for the Social Sciences
SCV	Supply Chain Visibility
SCC	Supply Chain Collaboration
OLT	Organisational Learning Theory
RBV	Resource-Based View Theory



LIST OF TABLES

Table		Page
4.1	Demographic Information	50
4.2	Descriptive Statistics	51
4.3	Indicator Loading, Construct Reliability and Validity	57
4.4	Discriminant Validity (HTMT)	59
4.5	Multicollinearity Statistics	61
4.6	R-squared	62
4.7	F-Squared	63
4.8	PLS Predict	65
4.9	Hypothesis Testing	66



LIST OF FIGURES

Figure	Page
1: Conceptual Framework	30
2: Specification Model	55
3: Structural Model	66
4: Slope Analysis	68



CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Performance measurement in supply chain management (SCM) literature encompasses various dimensions, as Huo (2012) illustrates, categorising it into customer-focused, supplier-focused, and financial performance. Of these dimensions, customer-oriented performance is a crucial aspect of operational efficiency within the supply chain (Asamoah et al., 2020; Yang et al., 2021; Tricando-Munoz et al., 2020). It evaluates the extent to which supply chains fulfil primary customers' essential requirements, including quality, adaptability, timeliness of delivery, and other pertinent factors (Huo, 2012). Emphasising the centrality of customer needs within business processes, this facet underscores a fundamental principle in SCM. Asamoah et al. (2020) advocate focusing on customer-side operations to enhance overall supply chain performance. Customer development, defined as a business's capacity to attract, satisfy, and retain customers (Amedofu et al., 2019), holds profound significance in organisational success, as Christopher (2016) noted. Customers are widely regarded as the lifeblood of businesses, with their engagement, satisfaction, and retention deemed pivotal for success (Asamoah et al., 2021).

In today's highly competitive markets, marked by increasingly discerning customers, organizations must foster responsiveness to adapt to market dynamics and efficiently meet customer needs. This responsiveness reflects the supply chain's capacity to promptly address evolving customer demands and navigate dynamic business environments (Danese et al., 2013). The strategic significance of a customer-focused approach is highlighted by Zang et al. (2020), who establish a positive correlation between customer orientation and organizational performance, particularly

evident in the achievements of Chinese firms. Research suggests that the management of manufacturing firms should prioritize customer-centric strategies to attain sustainable competitive advantages and superior performance (Valenzuela-Fernandez & Villegas, 2016; Tricando-Munoz et al., 2020).

Supply chain visibility is pivotal in facilitating customer-centric approaches within manufacturing firms. Research by Valenzuela-Fernandez & Villegas (2016) and Tricando-Munoz et al. (2020) highlights the necessity for management to prioritise customer-centric strategies to attain sustainable competitive advantages and superior performance. Scholars argue that to pursue survival and competitive advantages, firms must prioritise creating and disseminating relevant, timely, and updated information across their supply chains (Mishra et al., 2018; Routroy et al., 2018). Such information exchange enhances collaboration, visibility, competitive or collaborative advantage, and superior supply chain performance (Barrat & Oke, 2007; Singh et al., 2019).

Supply chain visibility, characterized by the capability to access and exchange information throughout supply chains in real-time, has become a crucial element in improving supply chain performance and competitive advantage (Barrat & Oke, 2007; Caridi et al., 2014). Visibility in the supply chain is increasingly recognised as a deliberate strategy for enhancing performance (Francisco & Swanson, 2018; Jeble et al., 2018; Kraft et al., 2020; Sodhi & Tang, 2019; Bechtsis et al., 2021; Somapa et al., 2018).). Arguing from the resource-based view theory, a firm's competitive advantage and superior performance are derived from its unique bundle of resources and capabilities (Wernerfelt, 1984). Supply chain visibility, the information and data obtained through visibility systems, can be considered valuable resources that enhance performance by producing products that meet customers' demands.

Scholars have acknowledged that the growing demand of customers has placed significant pressure on organisations to produce products that meet customer's needs (Orji & Ojadi, 2023; Acquah et al., 2021; Ralston et al., 2017). As a result, firms are encouraged to collaborate with supply chain partners and constantly learn to meet customers' needs (Orji & Ojadi, 2023). Acquah et al. (2021) indicated that an organisation's internal resources and operational efficiency alone are insufficient to enhance performance. Hence, there is a need for supply chain collaboration to improve the performance of the entire supply chain (Ralston et al., 2017). Supply chain collaboration (SCC) has emerged as a critical strategy due to its potential to enhance supply chain (SC) performance and provide sustained competitive advantage (Gold et al., 2010; Chauhan et al., 2022). Hui et al. (2015) define supply chain collaboration as purposeful relationships between firms to enhance their capacity to effectively manage internal and external operations to achieve supply chain objectives. Consequently, the resources and capabilities evolving from SCC have become key drivers of sustained competitive advantage (Gold et al., 2010; Chauhan et al., 2022), offering significant benefits to all SC members (Arshinder et al., 2011).

Conversely, according to organizational learning theory, companies with a robust learning orientation are more adept at leveraging the insights derived from heightened visibility, thereby augmenting customer-oriented performance (Argyris & Schön, 1997). Both researchers and practitioners increasingly recognise SC learning as a strategic imperative, with a consensus on its pivotal role in enhancing supply chain performance (Flint et al., 2008; Yang et al., 2018; Zhu et al., 2018). Major industry players like Toyota and Walmart have exemplified this trend, leveraging SC learning to drive global transformation (Esper et al., 2007; Lambrechts et al., 2012). These firms

have realised substantial benefits by fostering environments conducive to continuous learning from SC partners.

The essence of SC learning lies in the process through which a focal firm acquires, assimilates, and exploits knowledge across its internal functions as well as from its key suppliers and customers (Haq et al., 2020; Huo et al., 2019; Yang et al., 2018). This emphasis on learning highlights its criticality for maintaining competitiveness in today's dynamic business landscape (Caputo et al., 2019; Cheng & Fu, 2013; Yang & Lai, 2012). Central to SC learning is effective knowledge management within firms (Scuotto et al., 2017; Yang & Lai, 2012). Research findings highlight the profound impact of SC learning on various facets of organisational performance. For instance, Flint et al. (2008) demonstrated how learning from customers or suppliers can significantly enhance a firm's innovation processes and overall performance. Moreover, Silvestre et al. (2020) put forth a theoretical framework elucidating the critical role of SC learning in developing, adapting, and enhancing SC competencies, thereby fostering SC sustainability. This evidence underscores the strategic imperative of prioritising SC learning to drive continuous improvement and sustainable competitive advantage.

Leveraging supply chain visibility, collaboration, and learning to drive customer-oriented performance is crucial for global manufacturing firms, including Ghana. Manufacturing plays a significant role in the global economy, contributing substantially to GDP. For instance, in 2020, manufacturing accounted for approximately 15.6% of the global GDP (World Bank, 2021). In Ghana, the manufacturing sector also substantially contributes to the economy, accounting for about 12% of GDP in 2022 (World Bank, 2023). This highlights the significance of the manufacturing industry in Ghana's economic landscape and its potential for further

growth and development. The study aligns with SDG 9 by promoting efficient and sustainable manufacturing practices, fostering innovation within supply chains, and enhancing infrastructure development.

1.1 Statement of the Problem

The manufacturing sector faces escalating pressure to boost productivity while upholding product quality standards (Ikome et al., 2022). This pressure is exacerbated by factors like evolving customer preferences, fierce competition, advancing technology, and increasingly demanding customers (Shen et al., 2019). To address customer needs effectively, manufacturing supply chains must adapt swiftly by shortening product life cycles (Wieland et al., 2015) and integrating internal and external resources to attain a competitive edge (Asamoah et al., 2020). Scholars highlight the significance of customer-centric performance indicators such as satisfaction, relationship quality, and loyalty to fortify companies' competitive standing and market share (Leuschner et al., 2013; Ziggers & Henseler, 2016; Tricando-Munoz et al., 2020; Asamoah et al., 2020, 2021).

Ambroise et al. (2017) found that manufacturing firms can increase revenue and profits by prioritising service-oriented strategies that cater to customer needs. Asamoah et al. (2020) echo this sentiment, emphasising the importance of supply chain management in meeting customer requirements. They highlight the need for firms to evaluate supply chain performance based on customer-centric operations. Furthermore, research by Lubis et al. (2020) and Sayani (2015) stresses that organizations that prioritize customer relationships outperform competitors by fostering greater customer loyalty. Scholars propose various strategies for firms to address evolving customer needs. These include aggressive advertising (Kumar & Gupta, 2016), collaboration (Alfalla-Lugue et al., 2015), integration (Yang et al., 2021), product development

(Zhang & Wu, 2017), supply chain orientation (Patel et al., 2013), and social network relationships (Asamoah et al., 2020).

Despite efforts to meet customer demands, manufacturing firms face problems due to inadequate market research and a limited understanding of customer preferences (Nuttavuthisit & Thøgersen, 2017). Resource constraints and inefficient supply chain management also hinder firms' ability to maintain product quality standards. Moreover, many manufacturers prioritise cost reduction and operational efficiency over customer satisfaction, leading to a misalignment between organisational goals and customer needs (Lins et al., 2021). Poor communication channels and limited feedback mechanisms further impede firms' ability to address customer concerns promptly (Fatorachian & Kazemi, 2018). Owusu-Frimpong and Boateng (2017) argue that manufacturers often struggle with demand forecasting and accurate inventory management. The literature emphasises the importance of supply chain visibility in enhancing performance, with various studies confirming its contribution to improved performance (Al-Khatib, 2022; Caridi et al., 2014; Francisco & Swanson, 2018; Jeble et al., 2018; Kraft et al., 2020; Baah et al., 2020, 2021). However, none of these studies have empirically examined how supply chain visibility enhances customer-oriented performance in Ghana's manufacturing industry.

Baah et al. (2020) revealed that visibility encourages collaboration and trust among partners in the supply chain. They advocated for focal firms to share timely information with relevant stakeholders to achieve their objectives. Scholars have emphasized the substantial benefits of collaboration, including risk and resource sharing (Chen et al., 2017; Panahifar et al., 2018) and performance enhancement (Baah et al., 2020, 2021). However, Baah et al. (2021) noted that collaboration may not consistently improve performance. While some studies suggest a positive correlation,

others indicate a negative relationship, and some find no significant link (Yousefi et al., 2017; Rodger & Parry, 2020; Mor et al., 2018). These discrepancies emphasise the inconsistency in the relationship between collaboration and performance. Baah et al. (2021) stressed the need for further investigation to fully understand collaboration in the supply chain. Hence, there is a necessity for additional research to understand the role of supply chain collaboration in the relationship between visibility and customer-oriented performance in Ghana's manufacturing sector.

Furthermore, scholars stress the importance of leveraging supply chain learning to improve product quality and bolster firms' competitive advantage (Caputo et al., 2019; Zhu et al., 2018; Yang et al., 2018; Gu & Huo, 2020). Supply chain learning enhances firms' flexibility to meet production capacities and improve production and operation systems (Lei et al., 2019; Wang, 2018; Willis & Genchev, 2015). Chen et al. (2022) also support this notion, indicating that supply chain learning promotes participant interactions and enhances performance. However, the role of the supply chain within the Ghanaian context, particularly in manufacturing firms, remains unexplored. Additionally, the interplay between supply chain collaboration and learning on the relationship between supply chain visibility and customer-oriented performance in Ghanaian manufacturing firms remains unexplored. Against the gaps established, this study examines how manufacturing firms in Ghana can leverage supply chain visibility to drive customer-oriented performance and the role of supply chain collaboration and learning.

1.2 Purpose of the Study

This study examines the effect of supply chain visibility on customer-oriented performance and the role of supply chain collaboration and learning in Ghanaian manufacturing firms.

1.3 Research Objectives

1. To assess the effect of supply chain visibility on customer-oriented performance.
2. To examine the effect of supply chain visibility on supply chain collaboration.
3. To assess the effect of supply chain collaboration on customer-oriented performance.
4. To examine the mediating role of supply chain collaboration on the nexus between supply chain visibility and customer-oriented performance.
5. To investigate the moderating role of supply chain learning on the nexus between supply chain visibility and customer-oriented performance.

1.4 Research Questions

1. What is the effect of supply chain visibility on customer-oriented performance?
2. How does supply chain visibility affect supply chain collaboration?
3. What is the effect of supply chain collaboration on customer-oriented performance?
4. What is the mediating role of supply chain collaboration on the nexus between supply chain visibility and customer-oriented performance?
5. What is the moderating role of supply chain learning on the nexus between supply chain visibility and customer-oriented performance?

1.5 Significance of the Study

In Ghana's manufacturing sector, leveraging supply chain visibility to drive customer-oriented performance through collaboration and learning holds immense significance. The literature emphasises the crucial role of supply chain visibility in enhancing operational efficiency and responsiveness to customer demands. This study aims to contribute significantly to the existing body of knowledge by explaining the dynamics between supply chain collaboration and learning. By delving into these interconnected factors, policymakers can gain insights into formulating policies that foster a conducive environment for supply chain optimisation in Ghana's manufacturing

landscape. This research is poised to provide empirical evidence and actionable recommendations to inform policy decisions to enhance supply chain visibility and customer-oriented performance in Ghanaian manufacturing.

Policymakers in Ghana are confronted with the challenge of nurturing an environment conducive to fostering supply chain collaboration and learning among manufacturing firms. The findings of this study will serve as a valuable resource for policymakers in designing strategies that incentivise collaboration among stakeholders within the supply chain ecosystem. Furthermore, understanding how supply chain visibility can be leveraged to drive customer-oriented performance can empower policymakers to design targeted interventions to bolster the manufacturing sector's competitiveness. By aligning policies with the insights derived from this research, policymakers can play a pivotal role in enhancing the overall efficiency and resilience of Ghana's manufacturing supply chains.

For manufacturing firms in Ghana, the findings of this study have direct implications for their strategic decision-making processes. By embracing supply chain visibility and fostering collaboration and learning within their supply chain networks, firms can enhance their ability to anticipate and respond to evolving customer preferences and market dynamics. This study empowers manufacturing firms in Ghana with actionable insights into optimising their supply chain operations to serve their customers better. By adopting a customer-centric approach enabled by supply chain visibility, firms can strengthen their competitive position and drive sustainable growth in the increasingly dynamic and interconnected global marketplace.

1.6 Scope of the Study

This study is delimited to manufacturing firms in the Greater Accra Region of Ghana. Focusing exclusively on this specific geographical area allows a concentrated examination of the relationship between supply chain visibility, collaboration, learning, and customer-oriented performance within a defined context. By narrowing the scope to the Greater Accra Region, the study aims to delve deeply into the details of supply chain dynamics and performance metrics tailored to the manufacturing landscape of this particular region. However, it is essential to acknowledge that findings and recommendations may not be universally applicable to manufacturing firms in other areas of Ghana or other countries, as variations in industry structures, supply chain networks, and market conditions may exist.

1.7 Organisation of the Study

The study is divided into five distinct parts. Subheadings such as introduction, the background of the study, problem statement, purpose of the study, research objective, research questions, significance of the study, the scope of the study, limitations, definition of terms, and organisation of the study are explained in the introductory chapter. In the second chapter, a comprehensive literature review was conducted. The concept of critical variables for the study was discussed in reviewing the relevant literature, along with the theoretical review, the empirical review, the conceptual framework, and the research gap. This study's research methods and approach are outlined in the third chapter. This chapter is broken down into research philosophy and design, population, study area, sample and sampling process, data gathering method, data collection instrument, data collection protocol, data analysis, and ethical considerations. The discussion and analysis of the data are discussed and

presented in chapter four. The study's summary, conclusion and recommendations are addressed in Chapter 5.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The second chapter provided a comprehensive presentation and analysis of the relevant literature in light of the study objectives. Relevant concepts derived from the objectives were discussed and presented. The chapter was grouped into a theoretical review, conceptual review, empirical review, conceptual framework and hypothesis development.

2.1 Conceptual Review

The concepts of supply chain visibility, collaboration, learning, and customer-oriented performance are discussed in this section.

Supply Chain Visibility

Supply Chain Visibility (SCV) is gaining recognition as a key component in supply chain management, offering significant benefits in operational effectiveness and strategic decision-making (Brusset, 2016; Caridi et al., 2010a; Sodhi & Tang, 2019). Scholars such as Schoenthaler (2003), Tohamy (2003), McCrea (2005), and Barratt and Oke (2007) have provided various definitions of SCV. For instance, Schoenthaler (2003) characterizes supply chain visibility (SCV) as the accessibility of crucial information required for overseeing, controlling, and adjusting strategies and operations within the supply chain, from the procurement of services to delivery. McCrea (2005) explained SCV as receiving notifications about discrepancies in supply chain operations and reacting appropriately. Moreover, Barratt and Oke (2007) define it as the degree to which participants in the supply chain can access or exchange information deemed essential and mutually advantageous for their operations. They emphasize the importance of information accuracy, timeliness, completeness, and usability.

Several information attributes enhance supply chain visibility, including accessibility, accuracy, timeliness, completeness, and relevance. These attributes support effective decision-making processes (Somapa et al., 2018; Williams et al., 2013). They ensure that shared information is disseminated and meaningful, thereby directly improving operational control, reducing lead times, and enhancing overall quality within the supply chain (Lee & Rammohan, 2017; Swift et al., 2019). SCV also supports important areas such as risk management, resilience, and sustainability, enabling firms to handle risks better, adapt to disruptions, and embrace sustainable practices. It is crucial in enhancing supply chain performance by enabling proactive management of supply and demand fluctuations, inventory levels, and market dynamics (Sodhi & Tang, 2019; Bechtsis et al., 2021).

Furthermore, SCV significantly contributes to integration and collaboration within the supply chain. Sharing high-quality, accurate information improves coordination among partners, thereby enhancing the supply chain's agility and responsiveness to external changes (Holcomb et al., 2011; Baah et al., 2022). This collaborative environment, supported by robust visibility, fosters trust and strengthens long-term relationships with stakeholders, essential for maintaining a competitive advantage. The strategic advantages of SCV are particularly evident in its impact on various supply chain processes, such as planning, manufacturing, and distribution. Effective visibility leads to better inventory management and optimized supply chain operations, reducing costs and improving performance (Marchet et al., 2012; Zhang et al., 2011).

Supply Chain Collaboration

Collaboration within the supply chain (SCC) has emerged as a central strategy for companies aiming to surpass their rivals (Chen et al., 2017; Fawcett et al., 2015; Liao et al., 2017; Ramanathan & Gunasekaran, 2014; Soosay & Hyland, 2015). Various academics have put forward multiple definitions of SCC. Tan et al. (2002) characterize SCC as a mechanism that enables the management of interdependencies among supply chain partners across various domains, including operations, product/process designs, marketing endeavors, sales planning/forecasting, and strategic decision-making. Additionally, Manthou et al. (2004) delineate SCC as a paradigm wherein participants within the supply chain collaborate to mitigate risks and pool resources, thereby enhancing the overall competitive advantage of the chain. Jimenez-Jimenez et al. (2018) describe SCC as the collaborative effort between two or more independent businesses in the planning and execution of supply chain operations. SCC is defined by Flankegard et al. (2021) as the cooperative and reciprocal processes that parties use to promote understanding, common objectives, and resource sharing to achieve group goals.

These definitions show that working together, supply chain units and partners improve knowledge generation, joint asset leveraging, and interfirm learning (Baah et al., 2021). Supply chain objectives are achieved, and internal and external operations are efficiently managed using deliberate, synergistic partnerships between companies (Annosi et al., 2021; Acquah et al., 2021). Numerous businesses have embraced this approach to improve business performance by cutting expenses and increasing revenue (Cao & Zhang, 2011; Um and Kim, 2019), better forecasting accuracy through open information exchange (Nimmy et al., 2019; Ramanathan & Muyldermans, 2010), improved supply chain interaction among members (Cao & Zhang, 2011; Zhang & Cao,

2018), collaborative use of resources (Cao & Zhang, 2011; Ramanathan & Gunasekaran, 2014), and reward systems (Cao & Zhang, 2011; Ma et al., 2020).

SCC has the potential to enhance significantly firms' performance and provide substantial benefits to all supply chain members. Collaboration, such as through workflow redesign and the promotion of resource sharing, enhances performance in the supply chain by improving efficiency and coordination among members. Furthermore, resources and capabilities derived from collaboration have emerged as crucial elements driving sustained competitive advantage (Chauhan et al., 2022). Achieving particular strategic goals within supply chain networks necessitates the implementation of risk and reward-sharing mechanisms, which are only achievable through collaborative endeavors such as planning, product design, information exchange, and knowledge sharing (Chauhan et al., 2022; Van Hille et al., 2020).

Following Cao and Zhang (2011), SCC is widely acknowledged as a very effective strategy for gaining a competitive advantage. The authors propose that effective partnerships within supply chains, prioritising information sharing, goal alignment, resource sharing, and collaborative communication, substantially impact performance results. Dubey et al. (2018) contend that individual units and supply chain partners must collaborate to maintain competitiveness in intense competition.

Supply Chain Learning

Supply Chain Learning (SCL) is recognized as a crucial component of knowledge management that transcends organizational boundaries. It originates from organizational learning and significantly influences innovation and operational effectiveness (Zhang & Lv, 2015). Definitions of SCL vary widely; for instance, Spekman et al. (2002) see it simply as the acquisition of knowledge, whereas Bessant et al. (2003) describe it as involving complex interactions for upgrading and transferring

interfirm practices. Furthermore, Hult et al. (2004) broaden the concept to include knowledge acquisition, information distribution, and the creation of shared meanings, underscoring the importance of internal and external stakeholder involvement. Flint et al. (2008) depict SCL as a strategic coordination among the focal firm, its suppliers, and customers to address supply chain challenges effectively.

The SCL process involves acquiring, assimilating, and exploiting knowledge, as detailed by scholars such as Huo et al. (2019) and Yang et al. (2018). This encompasses a firm's capability to recognize and secure vital operational knowledge from various sources, including suppliers, customers, and internal operations, often through direct interactions and strategic partnerships (Zahra & George, 2002; Zhang et al., 2018). The assimilation phase involves analyzing and understanding different types of knowledge, which is crucial for effective exploitation, where the knowledge is applied to enhance production decisions and operational growth. The literature connects effective SCL with numerous positive outcomes like innovation, integration, relationship commitment, and overall supply chain performance, emphasizing the critical role of SCL in managing production and operational systems (Flint et al., 2008; Haq et al., 2020; Hult et al., 2004; Yang et al., 2018).

Moreover, SCL facilitates gathering and utilizing customer data to collaboratively solve problems, enhancing mutual understanding and promoting information exchange. This is particularly effective in understanding customer preferences for eco-friendly products, thus supporting long-term relationships and environmental partnerships (Hernandez-Espallardo et al., 2010; Fang & Zou, 2010; Kim et al., 2018; Feng et al., 2019). The literature reveals that SCL involves both interfirm and intrafirm learning processes, where knowledge is actively shared, interpreted, and integrated into daily practices, which enhances organizational

efficiency and innovation capabilities (Rebolledo & Nollet, 2011; Cheung et al., 2011; Selnes and Sallis, 2003). However, empirical evidence on the impact of SCL on performance has been mixed. While some studies report improvements in supply chain efficiency and innovation, others point to potential conflicts and innovation challenges stemming from an over-reliance on external knowledge sources (Dobrzykowski et al., 2015; Nguyen & Harrison, 2019). These findings highlight the importance of a balanced approach in managing both tacit and explicit knowledge within and across organizational boundaries to fully realize the benefits of SCL (Nagati & Rebolledo, 2013; Yang et al., 2019).

Customer-Oriented Performance

Customer-oriented performance has become a central theme in modern business strategies, emphasizing the importance of aligning organizational efforts with customer needs and expectations. This strategy is based on the belief that prioritizing customers' interests is crucial to an organization's culture (Chen, 2011). Huo (2012) expands on this idea by defining customer-oriented performance as an organization's ability to effectively meet customer needs, focusing on quality, flexibility, and timely delivery. Evaluating supply chain performance from the perspective of customer-centric operations in key firms is essential for enhancing overall performance, as customer satisfaction is a critical objective of supply chains. This approach aligns with supply chain management's (SCM) primary goals, which prioritize addressing the end user's interests (Asamoah et al., 2020). Assessing this performance aspect is crucial for evaluating the effectiveness of supply chain operations and gaining a competitive edge.

Customer-focused performance is defined by Evans and Lindsay (2005) as how well a company satisfies the demands and perceptions of its customers, including measures of dependability, responsiveness, timeliness of delivery, customisation, and

customer satisfaction. These indicators are vital for assessing a firm's effectiveness in serving its customers and evaluating the performance of service supply chains. Research by Saxe & Weitz (1982) and Zang et al. (2020) underscores the significant competitive advantage of prioritizing customers. A strategic focus on understanding and fulfilling customer needs can enhance customer loyalty and improve organizational performance (Lubis et al., 2020; Sayani, 2015). Donovan et al. (2004) and Hennig-Thurau (2004) agree, noting that companies with a customer-oriented focus generally outperform competitors without such a focus.

The link between customer-oriented performance and customer satisfaction is evident in how well-perceived performance aligns with customer expectations. When companies meet or exceed these expectations, customer satisfaction tends to increase. However, failing to meet expectations can result in dissatisfaction (Christopher, 2016). Understanding customer needs and developing effective marketing strategies are critical for strengthening customer relationships and fostering loyalty (Aburayya et al., 2020). This strategy is essential for achieving sustained success and outperforming competitors in the long term.

2.2 Theoretical Review

This research applies the resource-based view theory and the organisational learning theory to understand the relationship between supply chain visibility, collaboration, learning and customer-oriented performance. This section explains how the theories explain the relationships between the constructs.

Resource Based-View Theory

The firm's Resource-Based View (RBV) is a strategic management theory that emphasizes the role of internal resources in achieving and sustaining competitive advantage (Wernerfelt, 1984). RBV posits that firms are collections of heterogeneous

resources and capabilities that are imperfectly mobile across firms. The main assumption of RBV is that the variability in firm performance can be largely explained by differences in the resources and capabilities they control (Wernerfelt, 1984). Resources that are valuable, rare, inimitable, and non-substitutable (VRIN) provide the foundation for a firm's sustainable competitive advantage. By focusing on internal capabilities rather than external market conditions, RBV shifts the analysis to how firms can uniquely leverage their specific assets to create value that competitors cannot easily replicate (Barney, 1991; Teece et al., 1997).

RBV argues that not all resources are of equal importance or potential to create a competitive edge. Valuable resources help firms exploit opportunities or neutralize threats in their environment. Rarity ensures that many competing firms do not possess these valuable resources, which could diminish their potential for creating a competitive advantage. Inimitability means that these resources cannot be easily replicated or substituted by competitors, often due to unique historical conditions, causal ambiguity, or social complexity associated with the development of these resources. Finally, non-substitutability implies that no comparable resources can be substituted to confer the same benefits, thereby preserving the uniqueness of the resource (Connor, 2002; Taher, 2012).

The RBV provides a useful theoretical framework for analyzing the impact of supply chain visibility, collaboration, and customer-oriented performance. By applying RBV, firms can identify internal resources that contribute significantly to enhancing these aspects of supply chain management. For instance, supply chain visibility heavily depends on the firm's technological resources and information systems. These resources allow firms to track and monitor the flow of goods and information throughout the supply chain, which is crucial for effective decision-making and responsiveness to

market changes. According to RBV, such capabilities are valuable because they enable firms to exploit opportunities and mitigate risks more efficiently than competitors who lack similar visibility.

Collaboration in the supply chain is another area where RBV can be applied to understand how shared resources and capabilities between partners can lead to improved performance (Uddin, 2022). Strategic collaborations involve combining the unique resources of multiple firms, such as expertise, technologies, and processes, to achieve collective goals that may be unattainable individually. From an RBV perspective, these collaborations create a pooled resource base that is rare and costly to imitate, providing a competitive advantage (Um & Kim, 2019). Effective collaboration leads to enhanced supply chain agility, operational efficiency, and customer satisfaction, as partners can leverage each other's strengths to optimize the entire supply chain's response to customer demands.

Customer-oriented performance focuses on aligning resources to meet or exceed customer expectations regarding product quality, delivery speed, customization, and service. RBV highlights the importance of customer relationship management systems, skilled personnel, and organizational culture as key resources that enhance customer satisfaction. These resources are particularly valuable as they facilitate a deep understanding of customer needs and foster a customer-centric approach within the firm. By leveraging these unique assets, companies can achieve superior customer-oriented performance, satisfying current customer demands, building brand loyalty, and attracting new customers.

Lastly, integrating RBV with dynamic capabilities can further enhance the understanding of how firms adapt their resource base to sustain competitiveness in rapidly changing supply chain environments. This integration is crucial when

considering the volatility and complexity of modern supply chains, where customer preferences and technological advancements are constantly evolving. Firms that can dynamically reconfigure their resources to improve supply chain visibility, strengthen collaborations, and enhance customer-oriented performance are more likely to maintain a sustainable competitive advantage. By viewing these elements through the lens of RBV, managers can better strategize on resource allocation and development to optimize supply chain operations and achieve strategic business objectives.

Organisational Learning Theory (OLT)

Organizational learning theory is a significant framework in management and organizational studies, focusing on how organizations acquire, retain, and transfer knowledge to improve performance. (Argyris & Schön, 1978). The theory is built on several assumptions, including the idea that organizations are open systems that interact with their environments and can learn through feedback mechanisms (Argyris & Schön, 1978). It also assumes that learning can occur at different organizational levels, from individual to group to organizational learning (Senge, 1990). Additionally, organizational learning theory assumes that learning is a continuous process and that organizations must be adaptive and flexible to survive and thrive in dynamic environments (Huber, 1991). This theory posits that organizations, like individuals, can learn and improve their operations and outcomes through knowledge acquisition, dissemination, and interpretation. As such, organizations that effectively learn and adapt are more likely to succeed in dynamic markets (Habtoor et al., 2020).

Developments in organizational learning theory have moved towards more integrative and practical frameworks that emphasize knowledge management and the role of technology. Crossan, Maurer, and White (2011) propose a dynamic model of organizational learning that integrates the processes of intuiting, interpreting,

integrating, and institutionalizing knowledge. This model underscores the importance of individual and collective learning processes and how they interact across organizational levels. Moreover, technology facilitates organizational learning by enabling better communication, knowledge sharing, and innovation. The theory provides a valuable framework for understanding how supply chain learning can enhance the relationship between supply chain visibility and customer-oriented performance.

Supply chain visibility, which involves accessing real-time data throughout the supply chain, enhances decision-making and responsiveness to market changes (Barratt and Oke, 2007). However, the mere availability of data is not sufficient. Supply chain learning is vital in influencing how information is interpreted and utilized. Sambamurthy et al. (2003) argued that organizations that cultivate learning capabilities are better positioned to leverage capabilities, like supply chain visibility, into competitive performance outcomes. Thus, supply chain learning, as an extension of OLT, implies absorbing information and transforming it into actionable strategies aligned with customer needs, leading to enhanced customer-oriented performance.

Furthermore, the dynamic model of organizational learning proposed by Crossan, Maurer, and White (2011) elucidates how learning processes at the individual, group, and organizational levels can enhance the effectiveness of supply chain visibility. This model suggests that intuiting and interpreting information at the individual level can lead to better integration and institutionalization of knowledge across the organization, enhancing the overall responsiveness to customer demands. Companies with high levels of supply chain learning are more adept at using the insights gained from enhanced visibility to improve customer service, product customization, and overall customer satisfaction (Fawcett et al., 2008). Therefore,

supply chain learning acts as a crucial moderator by ensuring that the potential benefits of supply chain visibility are fully realized in the form of superior customer-oriented performance.

2.3 Empirical Review

An empirical review helps the researcher to compare and cite previous studies on a particular study. A review of the empirical literature provides information on previous research undertaken on the topic that is the focus of the investigation by other researchers and the findings from those studies. This section provides an empirical review of supply chain visibility, collaboration, learning and customer-oriented performance in greater depth. The review is structured per the objectives of the research.

Supply Chain Visibility on Customer-oriented Performance

Asamoah, Asare-Bediako, and Jacqueline (2023) conducted a study examining the influence of supply chain visibility on the performance of supply chains within the Ghana Health Service. Employing network theory as the theoretical foundation, their research centered on the Kumasi Metro Health Directorate as a case study. Data collection was carried out through a questionnaire, with analysis conducted using descriptive and inferential statistical methods. The study revealed that increased supply chain visibility positively impacts the supply chain performance at the Kumasi Metro Health Directorate. Additionally, Baah, Acquah, and Ofori (2021) investigated the effects of collaboration on supply chain visibility, stakeholder trust, and environmental and financial performance. Utilizing a partial least squares approach, this research, which employed a survey research design and quantitative methodology, utilized partial least squares structural equation modeling (PLS-SEM) for data analysis and interpretation, a suitable technique for predictive research models. The results indicated

that enhanced supply chain visibility improves environmental and financial performance.

In 2021, Singagerda, Fauzan, and Desfiandi investigated the effects of supply chain visibility, supply chain flexibility, and supplier development on the business performance of logistics companies in Indonesia. The study targeted 120 respondents from logistics firms located in Tangerang. Employing a quantitative approach, this research utilized structural equation modeling and SmartPLS for data analysis. Data collection was conducted through an online survey, utilizing Google Forms to distribute questionnaires to participants. The sample was selected using a simple random sampling method. The results indicated a significant and positive impact of supply chain visibility on the business performance of these companies. Additionally, Baah et al. (2020) explored the influence of information sharing within supply chains, specifically focusing on how supply chain visibility, agility, and collaboration affect supply chain performance. Utilizing a survey-based quantitative methodology, the research employed partial least squares structural equation modeling (PLS-SEM) for data analysis and interpretation, given its suitability for predictive research models. The findings demonstrated that supply chain visibility notably enhances collaboration, agility, and overall performance.

Dubey, Gunasekaran, and Roubaud (2020) investigated the implications of upstream supply chain visibility and product complexity on the sustainable performance of a focal company, particularly from the perspective of Indian manufacturers. Utilizing a contingent resource-based view, the study examined how product complexity alters the influence of upstream supply chain visibility (in terms of resources and capabilities) on social, environmental, and economic performance dimensions. The research entailed developing and testing a theoretical model using

survey data gathered from 312 manufacturing organizations in India. The findings demonstrated that supply chain visibility notably enhances social and environmental performance, particularly when moderated by product complexity.

Supply Chain Visibility and Supply Chain Collaboration

Using a partial least squares approach, Baah et al. (2021) investigated how supply chain collaboration influences supply chain visibility, stakeholder trust, and environmental and financial performance. Employing a survey research design and quantitative methodology, the study opted for partial least squares structural equation modeling due to its effectiveness in predictive research models. The research proposed that supply chain collaboration positively and significantly impact supply chain visibility, stakeholder trust, and environmental and financial performance. The findings supported this proposition, demonstrating that supply chain collaboration substantially improves supply chain visibility, stakeholder trust, and environmental and financial performances, implying favorable outcomes for companies embracing collaborative supply chain strategies.

In another study, Baah et al. (2021) assessed the influence of information sharing within supply chains, specifically focusing on its effects on supply chain visibility, agility, collaboration, and overall performance. Utilizing a survey research design and quantitative methods, the study employed partial least squares structural equation modeling (PLS-SEM), recognized for its suitability in predictive research models. The results indicated that information sharing significantly and positively impacts supply chain visibility, collaboration, agility, and performance. Additionally, supply chain visibility notably enhances collaboration, agility, and performance. Both supply chain collaboration and agility also significantly influenced supply chain

performance. These findings underscore the importance of information sharing in attaining competitive advantages and superior supply chain performance.

Supply Chain Collaboration and Customer Oriented Performance

Billah et al. (2023) conducted a study investigating the influence of the Internet of Things (IoT), supply chain collaboration, and ethical sensitivity on sustainable performance, considering the moderating effect of supply chain dynamism. The research framework aimed to enhance understanding of technology utilization within supply chains, building upon insights from prior studies. Data were collected from 290 executives representing various Ready-Made Garment (RMG) companies in Bangladesh, using a 29-item structured questionnaire rated on a 6-point Likert scale. The authors employed covariance-based structural equation modeling (SEM) for data analysis. The results revealed significant positive relationships between IoT and supply chain collaboration with social, economic, and environmental performance. Moreover, ethical sensitivity was found to positively influence social and economic performance. Supply chain collaboration also demonstrated positive associations with all three dimensions of performance.

Zardis et al. (2020) investigated the impact of strategy and scale constraints on supply chain collaboration and firm performance within the agri-food sector among SMEs. The study assessed collaboration through three constructs: horizontal, vertical, and customer engagement, while SME performance was evaluated based on growth, value for money, and innovativeness. The research analyzed two strategic approaches, price strategy and quality strategy, alongside three scale constraints: financial, efficiency, and innovation. Surveys were conducted with 504 agricultural SMEs, and hypotheses were tested using the resource-based view. A moderated hierarchical analysis was employed for data analysis. The findings indicated a positive effect of

supply chain collaboration on agri-SME performance. Additionally, it was partially confirmed that scale constraints moderate the relationship between supply chain collaboration and SME performance.

Um, and Kim (2019) examined the impact of supply chain collaboration on firm performance and transaction cost advantages, focusing on the moderating and nonlinear effects of governance mechanisms. Data were collected through an online survey targeting Korean manufacturing firms across various industry sectors. Confirmatory factor analysis was utilized to ensure the data's unidimensionality, reliability, and validity. Hierarchical regression analysis was then employed to test the hypotheses. The results indicated that supply chain collaboration enhances both firm performance and transaction cost advantages, with improved performance also leading to transaction cost advantages.

Panahifar et al. (2018) investigated the influence of supply chain collaboration on firm performance, highlighting the essential roles of information sharing and trust. The study surveyed 189 executives from various firms to explore the impact of collaboration enablers on effective collaboration and subsequent effects on organizational performance. Using structural equation modeling with partial least squares, the research analyzed relationships among four key enablers: trust, information readiness, information accuracy, and information security, and their effects on perceived collaboration success and firm outcomes, such as sales growth and overall operational performance. The findings revealed trust, information readiness, and secure information sharing significantly enhance supply chain collaboration. Secure information sharing emerged as the most critical factor for promoting collaboration centered around information sharing. Furthermore, the study demonstrated that effective collaboration substantially improves firm performance.

Mediating Role of Supply Chain Collaboration

No studies have yet explored the mediating role of supply chain collaboration in the relationship between supply chain visibility and customer-oriented performance. However, supply chain collaboration has been utilized as a mediator and moderator in other relational contexts. For instance, Shafique et al. (2024) investigated the influence of top management support and compatibility on adopting big data predictive analytics and its subsequent effects on supply chain collaboration and performance. Drawing upon organizational information processing theory as the foundational framework, the study collected data from 197 employees within the Chinese logistics sector. Analysis was conducted using partial least squares-structural equation modeling. The results affirmed the significance of top management support and compatibility in successfully integrating big data predictive analytics. Furthermore, the study demonstrated that big data predictive analytics positively impacts supply chain collaboration and performance. Moreover, it was revealed that supply chain collaboration mediates between big data predictive analytics and overall supply chain performance.

Zhou et al. (2023) investigated the impact of inter-organizational systems on supply chain agility under uncertain conditions, focusing on the mediating influence of supply chain collaboration. Their research hypotheses were evaluated using a two-wave, matched-pair survey involving business and IT executives from 156 manufacturing companies. The findings confirm the mediation role of collaboration, indicating that technological tools are not enough by themselves and require effective collaborative frameworks that improve communication, coordination, and collective decision-making. Also, Nwagwu et al. (2023) studied how artificial intelligence (AI) improves supply chain performance, focusing on the mediating role of supply chain collaboration within manufacturing and logistics companies in Pakistan. They collected

survey data from 351 employees across various manufacturing and logistics organizations. The findings revealed that AI significantly enhances supply chain performance. Moreover, the study found that supply chain collaboration partially mediates AI technology and supply chain performance.

Kwateng et al. (2022) explored how corporate environmental strategies impact the competitiveness of firms, with a particular focus on the mediating effect of supply chain collaboration. This research, grounded in the natural resource-based view theory, selected firms from the Ghana Club 100 as its sample. Regression analysis was employed to examine the proposed relationships. Findings from the study suggest that supply chain collaboration plays a significant indirect role in strengthening the connection between corporate environmental strategies and the competitiveness of firms. Also, Jimenez-Jimenez et al. (2018) analyzed how supply chain collaboration mediates the influence of information technology on innovation. They employed structural equation modelling to test their hypotheses, utilizing data from 200 manufacturing firms. The findings revealed that supply chain collaboration positively impacts technological innovation, indicating that working with external partners can lead to incremental and radical innovations. Additionally, the results demonstrated that information technology indirectly boosts both forms of product innovation via supply chain collaboration.

Salam (2017) explored the intermediary role of supply chain collaboration between technology, trust, and operational performance within the FMCG sector. Employing cross-sectional and descriptive methods concentrated on a single economy, the study discovered that adopting technology and trust among supply chain partners greatly enhances operational performance when facilitated through collaborative

practices. This suggests that collaboration acts as a facilitator and an essential conduit through which technology and trust are transformed into substantial performance gains.

Moderating Role of Supply Chain Learning

No study has yet explored the application of supply chain learning as a moderator in the relationship between supply chain visibility and customer-oriented performance in the Ghanaian context. Nonetheless, supply chain learning has been utilized in various contexts. For instance, Yang et al. (2023) examined the impact of reverse logistics and sustainable supply chain initiatives on sustainability performance, focusing on the moderating role of organizational learning capability. Their study incorporated data from 451 manufacturing firms in Hebei Province, China. They constructed a model and assessed the hypothesized relationships using partial least squares-structural equation modeling (PLS-SEM) through a two-step analytical process. The results indicated that both sustainable supply chain initiatives and reverse logistics positively affect sustainability performance, with sustainable supply chain initiatives also positively influencing reverse logistics. Additionally, organizational learning capability was found to moderate both the relationship between reverse logistics and sustainability performance and the relationship between sustainable supply chain initiatives and sustainability performance.

Li et al. (2022) explored the correlation between supply chain learning and performance by reviewing 54 empirical studies. They developed a conceptual framework and utilized a meta-analytical approach to investigate this relationship. Their findings confirmed the positive influence of supply chain learning on the performance of individual firms and entire supply chains. Informed by the knowledge-based view, the study revealed that learning from customers has a more significant impact on performance than learning from suppliers. Additionally, joint learning

exhibited a more substantial positive effect on performance than absorptive learning. Among various types of knowledge, business knowledge emerged as the most influential on performance, surpassing general, process, or technical knowledge. Furthermore, explicit knowledge had a greater effect on performance than tacit knowledge. The study also indicated that the impact of supply chain learning on performance was moderated by the type of performance measure and industry but not by regional economic development, suggesting the broad applicability of these findings.

Guo et al. (2020) investigated the role of Green Entrepreneurial Orientation (GEO) in promoting green innovation, emphasizing the mediating effects of supply chain learning. Through the development of a theoretical model linking GEO with green incremental and radical innovation, the study empirically tested its propositions using data from 416 Chinese enterprises. The results revealed that GEO positively influences both types of green innovation. Moreover, supply chain learning significantly contributes to green innovation and mediates the relationship between GEO and green incremental and radical innovation. This study enriches entrepreneurial orientation, green innovation, and supply chain learning theories, providing valuable insights for managers aiming to leverage GEO for advancing green innovation initiatives.

Huo et al. (2021) explored the impacts of information sharing on supply chain learning and flexibility performance, employing absorptive capacity theory and structural equation modeling. Analyzing data from 213 manufacturing firms in China, the study found that learning from suppliers and customers enhances internal learning. Additionally, information sharing positively affects all dimensions of supply chain learning. Furthermore, internal and customer learning directly influence flexibility

performance, mediating the relationship between supplier learning and flexibility performance. Moreover, information sharing moderates the relationship between supplier learning and flexibility performance. These findings contribute to academic literature and provide a novel framework for understanding the interactions among information sharing, supply chain learning, and flexibility performance.

Hag et al. (2020) investigated the influence of human resource management on supply chain learning and innovation performance. The research tested a conceptual model using structural equation modeling and data from 213 manufacturing firms in China. The results indicated that empowerment enhances all dimensions of supply chain learning, while training enhances supplier and internal learning, with no significant effect observed for teamwork. Additionally, human resource management practices collectively impact the dimensions of supply chain learning. Furthermore, both customer and internal learning directly contribute to innovation performance. Supplier learning complements internal learning but substitutes customer learning regarding innovation performance.

Haq (2020) explored the relationship between supply chain learning and organizational performance among Chinese manufacturing firms. Grounded in the knowledge-based view and absorptive capacity theory, the study employed structural equation modeling to analyze data from 213 manufacturing firms. The findings revealed that learning from suppliers and customers enhances internal learning. Moreover, both customer and internal learning directly impact operational performance, with internal learning mediating the effect of supplier learning on operational performance. Furthermore, the study found that the three dimensions of supply chain learning do not directly influence financial performance; operational performance serves as a mediator in this relationship.

2.4 Conceptual Framework and Hypothesis Development

A conceptual framework examined the relationships between supply chain visibility, collaboration, learning and customer-oriented performance. The study used four variables: an independent variable (supply chain visibility), a mediator (supply chain collaboration), a moderator (supply chain learning) and a dependent variable (customer-oriented performance). The relationships between these variables are illustrated in Figure 1.

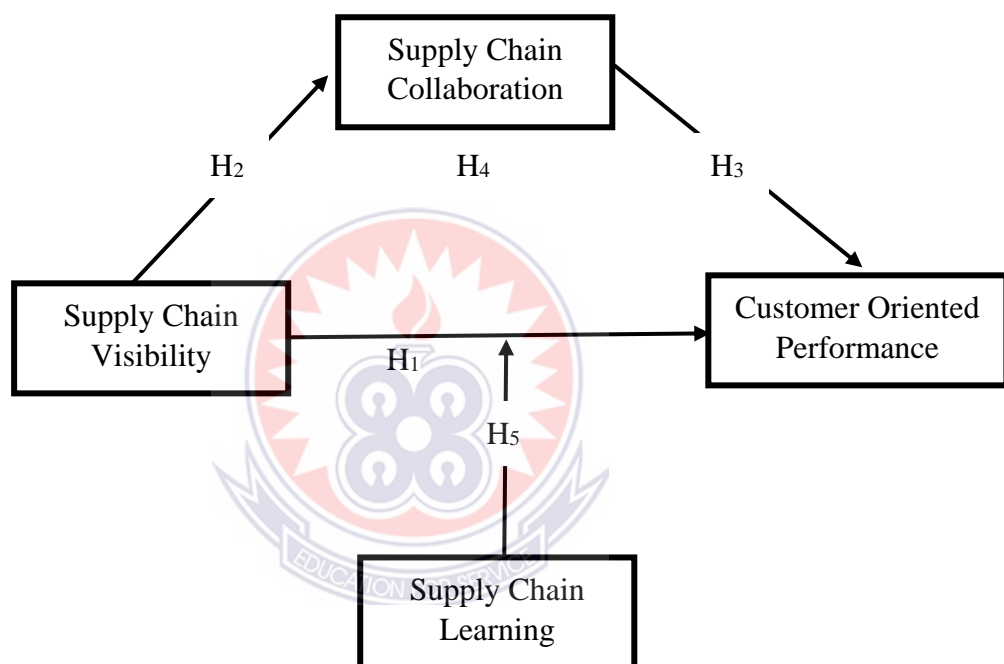


Figure 2.1: Conceptual Framework

2.4.1 Supply Chain Visibility and Customer Oriented Performance

Supply chain visibility (SCV) has become a critical focus in supply chain management due to its significant impact on the performance of the entire supply chain. Research shows that SCV enables improved coordination and collaboration among stakeholders, which leads to more efficient and effective operations (Yu et al., 2001; Choi & Sethi, 2010). Caridi et al. (2014) argued that SCV fosters strong supply chain relationships and is deemed essential for collaboration and performance enhancement,

as it facilitates the sharing of timely and relevant information among supply chain members. Visibility in supply chains is instrumental in handling uncertainties and responding swiftly to market dynamics, which are crucial for maintaining service reliability and responsiveness. Holcomb et al. (2011) highlighted that visibility enhances connectivity, which is key in managing uncertainties through informed and speedy responses. Further, SCV helps to accelerate decision-making processes regarding the quality and nature of sustainable products (Cao & Zhang, 2011; Maghsoudi & Pazirandeh, 2016).

SCV enables firms to handle risks better, adapt to disruptions, and embrace sustainable practices. It is crucial in enhancing supply chain performance by enabling proactive management of supply and demand fluctuations, inventory levels, and market dynamics (Sodhi & Tang, 2019; Bechtsis et al., 2021). Studies have emphasized that visibility is not just beneficial but an inherent part of enhancing supply chain performance, enabling firms to align their operations more closely with customer demands and improve supply chain agility, which in turn boosts performance metrics (Francisco & Swanson, 2018; Jeble et al., 2018; Kraft et al., 2020; Agrawal et al., 2022; Bechtsis et al., 2021, 2022; Sodhi & Tang, 2019). Arguably, the RBV suggests that firms can enhance their competitive advantage through organizational resources such as advanced information systems, collaborative capabilities, and technological innovations (Barney, 1991; Teece et al., 1997; Wernerfelt, 1984). Firms can leverage real-time information (SCV) to predict disruptions, adjust to demand fluctuations, and optimize delivery schedules more efficiently than one with limited visibility. This capability can be a significant competitive differentiator in industries where timely delivery and service reliability are critical. Such capabilities foster a more agile and

customer-responsive supply chain, directly impacting the firm's overall market position and success. Based on the RBV and empirical reviews, *the study hypothesises that;*

H1: Supply chain visibility has a positive relationship with customer-oriented performance

2.4.2 Supply Chain Visibility and Supply Chain Collaboration

Supply chain visibility (SCV) is crucial for fostering collaboration within supply chains, significantly enhancing the ability of firms to respond to market demands and operational challenges effectively (Barratt & Oke, 2007; Caridi et al., 2014). SCV ensures a continuous flow of current information throughout the supply chain network, allowing stakeholders to make well-informed and timely decisions (Blome et al., 2013; Dubey et al., 2020). Baah et al. (2020) highlight that real-time access to essential data synchronizes efforts among partners and boosts the supply chain's overall agility. Increased visibility has enhanced trust and deepened partnerships, as stakeholders are confident in their access to dependable and pertinent information, facilitating proactive adjustments and coordinated strategies. Research supports the notion that improved visibility strengthens collaboration by creating a foundation of trust and shared responsibilities, which is essential for the successful integration and cooperation among supply chain entities (Fawcett et al., 2007; Barratt & Oke, 2007; Brusset, 2016; Caridi et al., 2014; Dubey et al., 2020). Thus, SCV catalyzes effective supply chain collaboration (SCC), crucial for optimizing overall performance and enhancing customer satisfaction. Thus, the study hypothesises that;

H2: Supply chain visibility has a positive relationship with supply chain collaboration.

2.4.3 Supply Chain Collaboration and Customer Oriented Performance

Scholars have highlighted the critical role of supply chain collaboration (SCC) in today's dynamic business environment (Chen et al., 2017; Fawcett et al., 2015; Liao et al., 2017; Soosay & Hyland, 2015). SCC entails the strategic alignment and integration of operations and information sharing across all partners in the supply chain, aiming to foster more unified and responsive practices. This type of collaboration leads to enhanced service delivery, improved customization capabilities, and increased overall customer satisfaction (Wong et al., 2011). Under the SCC framework, firms exchange information and experiences, which aids in building a comprehensive understanding of the supply network. This exchange enhances the supply network's flexibility, control, timely delivery, and transparency.

Furthermore, SCC enables firms to collaborate on process and production design decisions, quality management, delivery, and cost control. Timely information sharing facilitates collaborative decision-making, which is crucial for enhancing organizational performance (Kumar et al., 2017; Pakdeechoho & Sukhotu, 2018; Um & Kim, 2019). Effective SCC also leads to a deeper understanding of end-consumer needs and market dynamics, essential for maintaining high customer satisfaction and gaining a competitive edge. In line with the Resource-Based View (RBV) theory, SCC uses strategic resource utilisation to create goods or services that are valuable, rare, unique, and cannot be replaced (VRIN). This improves the performance of the supply chain as a whole (Barney, 1991; Zhang, 2011). Hence, this study hypothesizes that;

H3: Supply chain collaboration has a positive relationship with customer-oriented performance .

2.4.4 Mediating Role of Supply Chain Collaboration

Research by Baah et al., (2020; 2021) revealed that supply chain visibility plays an essential role in enhancing performance. They argued that firms can improve their decision-making process because of the accessibility of real-time information. Visibility provides the necessary data to drive decision-making but does not automatically translate into improved performance unless the partners work collectively. Caridi et al., (2014) argued that SCV fosters strong supply chain relationships and is deemed essential for collaboration and performance enhancement, as it facilitates the sharing of timely and relevant information among supply chain members. Baah et al. (2020) emphasized that real-time access to essential data synchronizes efforts among partners and boosts the supply chain's performance. Increased visibility has enhanced trust and deepened partnerships, as stakeholders are confident in their access to dependable and pertinent information, facilitating proactive adjustments and coordinated strategies. A study by Zhang et al., (2015) revealed that collaboration plays an important role in the nexus between supply chain traceability and innovation.

Additionally, the RBV suggests that merely possessing resources (such as data on supply chain activities) is insufficient for achieving a competitive advantage. The capability to effectively utilize these resources through processes like collaboration transforms resources into a source of enhanced performance. Studies and the RBV collectively demonstrate that while supply chain visibility directly impacts various performance metrics, its full potential is often unleashed through collaborative efforts.

Hence, the study hypothesizes that;

H4: Supply chain collaboration positively enhances the nexus between supply chain visibility and customer-oriented performance.

2.4.5 Moderating Role of Supply Chain Learning

Supply Chain Learning is recognized as a crucial component of knowledge management that transcends organizational boundaries. Huo et al. (2019) expounds that supply chain learning involves acquiring, assimilating, and leveraging information and expertise not only within the focal organization but also across its upstream (suppliers) and downstream (customers). This comprehensive integration and utilization of knowledge are pivotal for optimizing processes and responses throughout the supply chain. Flint et al. (2008) reinforce the significance of organizational learning, highlighting it as a critical factor in enhancing operational capabilities and adaptive strategies. Similarly, Gibson et al. (2016) recognize supply chain learning as essential for achieving a sustainable competitive advantage by enabling continuous improvement and innovation in supply chain practices. The study argues that when organizations and their supply chains effectively learn and adapt based on the insights gained from visibility, they are better positioned to implement strategic changes that improve efficiency, responsiveness, and ultimately, performance. The organizational learning theory emphasizes the importance of knowledge acquisition, dissemination, and utilization within organizations. The theory provides a framework for understanding how information gained through enhanced visibility can be effectively integrated into the organization's operations, leading to improved performance outcomes. It posits that learning-oriented organizations are better equipped to utilize available information to enhance responsiveness and adaptability in their supply chains. The study hypothesizes that;

H5: Supply chain learning positively moderates the nexus between supply chain visibility and customer-oriented performance.

2.5 Chapter Summary

This chapter provides a comprehensive evaluation of the relevant literature and explains the theories supporting the hypotheses established in the study. Emphasis is placed on the relationship between supply chain visibility, collaboration, learning and customer-oriented performance. Finally, the study develops a conceptual framework based on its conceptual review and objectives.



CHAPTER THREE

RESEARCH METHOD

3.0 Introduction

Chapter Three discussed the research method used in the study. The chapter discussed the research philosophy and design, population, sample size, sampling and data collection techniques, various data collection instruments, and procedures for measuring and analysing the data. As a result, this section explained how the entire study was conducted. Issues of reliability and ethics were not left out in this chapter. The chapter concludes with a summary of the various issues articulated in the study.

3.1 Research Paradigm

The term paradigm was introduced by Kuhn in the year 1962. Kuhn defined a research paradigm as a collection of scientifically agreed-upon principles for analyzing and addressing problems (Kuhn, 1970). The research paradigm guides the decisions of researchers. It helps researchers to define a research problem carefully, formulate objectives and research questions, and determine the research's reality, methodological approach, and knowledge base (Kivunja & Kuyini, 2017; Khatri, 2020). The paradigm consists of four components: ontology (what we think about the world), axiology (ethical implications to be considered when conducting research), methodology (a valid and very well approach to data collection), and epistemology (knowledge and how it is obtained and tested) (Kivunja & Kivunja, 2017; Aliyu *et al.*, 2015; Mertens, 2010).

Denzin & Lincoln (2018) grouped the paradigms into seven categories: feminist, positivism/postpositivism, Marxist, ethnic, constructivism, queer theory, and cultural studies. The study's goal falls within the positivist approach because a hypothesis can be developed and tested objectively. The specific objective of this study requires gathering data to generalise the results to the entire population. The positivist paradigm enables social scientists to present their research as experts in a detailed, systematic,

and systematic way (Hasan, 2016; Benton & Craib, 2010). According to positivists, research is conducted independently of society, and phenomena are evaluated using objective standards. It originates from epistemological conventions that a "belief is an external reality constituted of facts structured in law-like manner" (Evered & Louis, 1991).

The ultimate focus of the positivist inquiry is to reveal causal relations or explanatory relationships that result in a prediction of a phenomenon being studied (Sciarra, 1999). The positivism paradigm holds that research is suitable if it has both internal and external validity and is objective and reliable (Rehman & Alharthi, 2016). To gather information, positivists typically employ quantitative research techniques. Under the positivist paradigm, the study's results can be extrapolated (Alharahsheh & Pius, 2020). The positivist research paradigm assisted the researcher in gathering data, analyzing it, and presenting the results unbiasedly to establish a relationship between the variables (supply chain visibility, collaboration, learning, and customer-oriented performance). The study's findings can be generalised to the entire population under the positivist paradigm (Alharahsheh & Pius, 2020).

3.2 Research Design

A research design provides direction for the researcher. Research design is the overall strategy or blueprint that outlines the plan for conducting a research study. It specifies the methods and procedures for collecting, analyzing, and interpreting data (Creswell & Creswell, 2018). Similarly, Akhar (2016) views research design as the blueprint or the strategy for the entire research to achieve the study's objective. Research design can be classified into explanatory, descriptive, longitudinal, causal, cohort, case study, and action design (Yazdani *et al.*, 2021). Research design aims to establish the relationship between variables to determine the cause and effect (Maxwell,

2012). Research design choice depends on the research type, the study's purpose, and the unit of analysis (Bengtsson, 2016).

This study relied on the explanatory research design. An explanatory research design helps predict the relationship between variables and explains the cause and effect of the relationships. It also describes how variables influence other variables (Siemsen et al., 2010). Babbie (2016) indicates that the explanatory research design allows researchers to build theoretical frameworks, predict future occurrences, and inform evidence-based decision-making. It is particularly valuable in complex fields where understanding the interplay between multiple factors is essential for advancing knowledge and practice. Explanatory research thus enhances the depth and scope of scientific inquiry, contributing to developing robust, generalizable findings that can be applied across various contexts. Researchers can formulate hypotheses based on the trends in data to help predict future outcomes (Potwarka *et al.*, 2019). The study employed the explanatory research design to explain the relationship between supply chain visibility, collaboration, learning and customer-oriented performance.

3.3 Research Approach

The term "research approach" refers to processes and procedures involving data collection, analysis, and interpretation. Research approaches are grouped into quantitative, qualitative, and mixed- methods (Levitt *et al.*, 2018). The research employed a quantitative research design. The approach was selected because of the chosen paradigm (the positivism paradigm). The quantitative approach helps test hypotheses by examining the relationship among variables (Creswell & Creswell, 2017). The quantitative approach relies on numerical data to explain phenomena. Such numerical data are analysed statistically (Shiau *et al.*, 2019; Chapman & Feit, 2019).

The quantitative approach begins with data collection and ends with analysing data with inferential or descriptive statistics (Tashakkori & Teddlie, 2003).

Additionally, the quantitative approach relies on the deductive approach. The aim is to test theories and hypotheses objectively by defining a research problem and collecting and analysing data to decide whether to accept or reject a theory or a hypothesis (Zyphur & Pierides, 2020). When the population being studied is large, quantitative data is appropriate. Similarly, the quantitative method is simple and time-saving (Singer & Couper, 2017). The quantitative approach has some drawbacks compared to the other method. The quantitative method isn't easy to handle because it deals with numerical data. As a result, researchers must devise strategies to ensure the validity and reliability of quantitative research. It also restricts respondents from providing further information on the subject under study (Stockemer *et al.*, 2019).

This study employed the quantitative research method to help explain the relationship between supply chain visibility, collaboration, learning and customer-oriented performance. The study relied on inferential statistics to establish the relationships. The approach was selected to help test hypotheses and theories, control bias, and decide to either accept or reject the hypothesis or theories.

3.4 Study Area

The study is conducted in the manufacturing, specifically the food and beverage sector in the Greater Accra Region. The food and beverage sector encompasses all businesses and organizations processing, packaging, and distributing raw food ingredients. This industry includes both alcoholic and non-alcoholic beverages, as well as prepared, fresh, and packaged foods. The Ghanaian food and beverage industry has contributed substantially to the country's economic growth as well as to the general nutrition of its citizens. The food and beverage sector significantly contributes to

Ghana's Gross Domestic Product (GDP) and is a major source of employment. The manufacturing sector, which includes food and beverages, contributes approximately 29% to the national GDP (GSS, 2021). Moreover, it provides numerous job opportunities, employing thousands of individuals across various stages of production, from raw material sourcing to packaging and distribution. This contribution is critical in reducing unemployment rates and improving living standards in the Greater Accra Region and beyond (World Bank, 2020).

Using the manufacturing sector for this study is essential due to its substantial economic impact and potential for growth. Researching this sector can provide insights into operational efficiencies, market dynamics, and consumer preferences, which are vital for enhancing competitiveness and sustainability. Additionally, studying this sector can inform policy decisions, support the development of value chains, and promote food security. Due to the concentration of firms within the areas, emphasis was also given to firms in Accra. The Greater Accra Region's prominence in this industry makes it an ideal focal point for research, offering a comprehensive understanding of both local and broader economic influences within Ghana's manufacturing landscape. According to the Association of Food and Beverages Manufacturing Firms, the Greater Accra Region of Ghana has 152 registered food and beverage manufacturing firms, representing 82.5% of the total registered members nationwide.

3.5 Population

The term "population" refers to the entire group of individuals, objects, or elements that share common characteristics and are of interest to the researcher. Population is the total set from which a sample can be drawn for a study (Creswell, 2014). The definition of the population is crucial as it ensures that the study's findings are applicable and relevant to the broader group, enhancing the validity and

generalizability of the research results. The total population of registered food and beverage manufacturing firms in the Greater Accra Region is 152, representing 82.5% of the entire population in Ghana. The Greater Accra Region is selected for the study due to its significant concentration of these businesses, enhancing the research's efficiency and relevance. With 152 registered firms, this region represents 82.5% of the entire population of such firms in Ghana, highlighting its pivotal role in the industry. The high concentration of firms in Greater Accra makes it an ideal focus area for the study, ensuring a comprehensive analysis of industry practices, challenges, and opportunities within a major industrial hub. This regional focus allows for more accurate and detailed insights, crucial for formulating effective policies and strategies tailored to the sector's needs.

3.6 Sample and Sampling Procedure

Sampling is selecting a percentage or a representative of the entire population (Ritchie *et al.*, 2013). Zikmund *et al.* (2013) define a sample as a population subset with common characteristics. Bambale (2014) emphasised that a population sample consists of that proportion of the number of units selected for investigation. Sampling procedures are grouped under probability and non-probability sampling techniques. Probability sampling relies on random selection, ensuring that every member of the population has a known and equal chance of being included in the sample. This method enhances the representativeness of the sample and allows for the generalization of results to the entire population, commonly used in quantitative research (Creswell, 2014; Bryman & Bell, 2022). On the other hand, non-probability sampling does not involve random selection, making it more susceptible to bias. It is often used in exploratory research to gain deeper insights rather than generalize findings. Although less representative, non-probability sampling can be practical and cost-effective,

especially when dealing with hard-to-reach populations (Etikan, Musa, & Alkassim, 2016; Saunders et al., 2019).

The study employed the a probability samplind technique specifically census sampling technique (probability sampling technique). The census sampling technique systematically enumerates all members of the population (Pandey & Pandey, 2021). It is the totality of all entities in the population. When the population is small, the census is appropriate. The census ensures that all participants (the manufacturing firms) are equally likely to be selected (Tyrer & Heyman, 2016). On the other hand, the census sampling technique is costly and time-consuming to implement, but the results are reliable and accurate. The census sampling technique reduces sampling error because all populations are considered. This study used the census sampling technique because of the number of manufacturing firms in the Greater Accra Region. All the manufacturing firms (152) in the Greater Accra Region were considered for this study.

3.7 Time Horizon

The study employed a cross-sectional approach to data gathering. A cross-sectional time horizon refers to a research approach that collects data simultaneously or over a short period, providing a snapshot of a phenomenon. This type of study design is widely used to identify patterns, relationships, and correlations among variables without considering changes over time (Saunders et al., 2019). The primary advantage of a cross-sectional time horizon is its efficiency in data collection, allowing researchers to gather comprehensive data from a large sample quickly. This method is particularly useful in social sciences and business research, where time and resource constraints often limit the feasibility of longitudinal studies (Zikmund, 2013). Furthermore, cross-sectional studies are instrumental in generating hypotheses for future research, making them a critical tool for explanatory studies (Bhattacharjee, 2012).

3.8 Data Collection Instrument

A primary data collection instrument, more precisely a structured questionnaire, was employed in this study. This was appropriate because of the research approach and research design used. Explanatory study designs are naturally structured. Therefore organised primary data collection procedures are required (Maxwell, 2012). A questionnaire is a tool for collecting data that consists of closed-ended and open-ended questions given to research respondents to acquire the respondents' objective thoughts on a subject (Singer & Couper, 2017). Similarly, Malhorta and Briks (2007) defined a questionnaire as a collection of questions approved for use by respondents in data collection.

Questionnaires are the most common data-gathering tool in research and can measure issues crucial to business and growth (Malhotra & Birks, 2007). A questionnaire is suitable for gathering information from a large number of people. It aids in collecting objective data from a large group to ensure reliable and valid responses. The individual items on the questionnaire were carefully extracted from validated literature. Supply chain visibility and collaboration comprised 5 items, supply chain learning comprised 7 items, and customer-oriented performance comprised 8 items. The questionnaire is divided into five sections. Section A discusses the demographics of the respondents. The supply chain visibility was addressed in Section B of the questionnaire. Supply chain collaboration and learning were addressed in sections C and D, respectively. Lastly, customer-oriented performance was addressed in Section E. The respondents' thoughts were assessed using a 7-Likert scale (thus 1=Slightly agree to 5 = Strongly Agree). A structured questionnaire was chosen as the preferred instrument due to its advantages over the other instruments. Questionnaires are simple to construct, cost-effective, yield uniform results, and preserve high

confidentiality. However, strategies for gathering data are needed to ensure validity and reliability.

3.9 Variable and Measurement

The various items used to measure the constructs were rigorously identified from the existing research. All the items were adopted and modified to suit the study. The research focused on the four main studies: supply chain visibility, collaboration, learning, and customer-oriented performance. Items for supply chain visibility were adopted from Baah et al. (2020), Dubey et al. (2018), and Mubarak et al. (2021). Similarly, supply chain collaboration ideas were adapted from Uddin (2022) and Baah et al. (2020). Also, the items for supply chain learning were adapted from Haq (2020), Guo et al., (2020) and Zhu et al., (2018). Lastly, the items for customer-oriented performance were adapted from Asamoah et al. (2019;2021) and Yang et al. (2021). All the items/scale have been validated using the Cronbach alpha and composite reliability. Their values all exceeded Hair et al.'s recommended threshold of .70 (2017).

3.10 Reliability and Validity

The validity and reliability of the study were considered to ensure the consistency and content validity of the instrument. When it comes to validity, Cook and Reichardt (1979) define it as the best available estimation of the truthfulness of a given inference. Reliability is defined as the ability of an instrument to provide accurate and consistent results over a period of time in the same situation and with the same people (Yilmaz, 2013). The instrument's consistency is an essential consideration in the evaluation of reliability. The most widely used internal consistency metric is Cronbach's alpha. Cronbach's alpha is the most reliable method for determining the reliability of the questionnaire.

Cronbach's alpha must be greater than 0.7 to ensure the reliability of the research instrument (Bujang *et al.*, 2018). The composite reliability criterion is used to assess the reliability of the construct. The composite reliability must be at least 0.7. (Hair *et al.* 2017). Also, the outer loadings of an indicator must be greater than 0.7 for reliability (Hair *et al.*, 2012). The composite reliability and convergent validity help decide whether an item with an outer loading between 0.4 and 0.7 should be kept (Hair *et al.*, 2017). The average variance extracted (AVE) must be greater than 0.5 to ensure convergent validity (Hair *et al.* 2017). The construct's discriminant validity was examined using the Fornell-Lacker and the heterotrait-monotrait ratio of correlations (HTMT). The square root of AVE must be higher than the correlation between the reflective construct and all other Fornell-Lacker constructs (Henseler *et al.*, 2015; Voorhees *et al.*, 2016). Similarly, the HTMT values should not be higher than 0.90 to prove discriminant validity. (Henseler *et al.*, 2015).

Almanasreh (2019) argues that an instrument has content validity if the measurements in the questionnaire fully represent the instrument's content. The researcher pretested the instrument to ensure it was free from spelling mistakes, poor phrasing, and confusing questions. It is widely accepted that questionnaires do not appear independently; instead, they are developed, shaped, and modified to ensure validity. The questionnaire was submitted to procurement experts, peers, and lecturers for approval and correction before being administered to the respondents.

3.11 Data Collection Procedures

The data collection exercise was carried out for two months (from May to June 2024). An introductory letter was sent to the manufacturing firms to ensure smooth data collection. The study's objective and purpose were made known to the firms. This made it easier for the respondent to provide accurate information to the questions. The

researcher guided the respondent through the questionnaire process. The estimated duration for answering the questionnaire is 20 – 45 minutes. The duration gave the respondent ample time to read and understand the questions before responding. The researcher dropped the questionnaires with the firms and later went back for the questionnaires according to the agreed time provided by the entities. Contact details were exchanged after the data was administered. The researcher contacted the respondents at least once to remind them of the questionnaires. As a result, the questionnaires were received on time despite the respondents' busy schedules.

3.12 Data Processing Tools

Statistical Package for Social Sciences (SPSS) version 26 and SmartPLS-SEM 4 were used for data processing and analysis. The retrieved questionnaires were coded in SPSS. The SPSS data file was saved as a comma-separated values file (CSV—Comma delimited) and imported to Smart PLS-SEM 4 for further analysis. Smart PLS-SEM 4 is suitable for testing hypotheses and theories. Hair et al. (2017) revealed that SmartPLS SEM is well-suited for analyzing complex models with multiple latent variables and paths, which is common in social sciences, business, and management research. This capability allows researchers to simultaneously assess multiple relationships and interactions among variables, providing a holistic data view. Additionally, Hair et al. (2019) argued that Smart PLS-Sem, unlike the traditional covariance-based SEM, SmartPLS SEM is a variance-based technique that does not require data to be normally distributed. This flexibility makes it ideal for real-world data, which often deviate from normality. Also, Hair et al. (2017) revealed that the bootstrapping technique in SmartPLS provides robust significance testing for paths and loadings, enhancing the reliability of the results. Additionally, SmartPLS is known for

its strong predictive accuracy, making it useful for forecasting and hypothesis testing (Hair et al., 2017).

3.13 Data Processing and Data Analysis

The Data obtained from the respondents was adequately prepared to ensure that the data collected contained no errors before data entry. Numbers were assigned to all retrieved questionnaires to help in sorting non-response questionnaires. The retrieved questionnaire was edited and coded using SPSS and analysed using Smart PLS SEM 4. The demographics were analysed using frequency, mean, and standard deviation with SPSS version 26. The SPSS data file was saved as a comma-separated values file (CSV – Comma delimited) and imported to SmartPLS SEM 4 for further analysis. A reflective and formative model was created to test the measurement model and hypothesis, respectively. To confirm the construct's validity and reliability, factor loadings were calculated to ensure that all indicators were greater than 0.7. Composite reliability and discriminant validity were assessed to ensure that all the quality criteria met the preferred threshold. The composite reliability must be greater than 0.7. (Hair *et al.* 2017). Also, the Average variance extracted (AVE) must be greater than 0.5 (Hair *et al.* 2017). The square root of AVE must be higher than the correlation between the reflective construct and all other Fornell-Lacker constructs (Henseler *et al.*, 2015; Voorhees *et al.*, 2016). Similarly, the HTMT values shouldn't be higher than 0.90. (Henseler *et al.*, 2015).

Additionally, a consistent bootstrap was performed with 5000 samples to determine the relationship between the exogenous (supply chain visibility), mediating (supply chain collaboration), moderating (supply chain learning), and endogenous variable (customer-oriented performance). The t-statistics and p-values were used to determine the relationship between the variables. The objectives were analyzed using

an inferential analysis tool. The inferential analysis tool (structural equation modeling) was considered because the objective was to establish the relationships between the variables, as indicated in the first chapter of the research. The demographics were assessed using descriptives (such as percentages, frequencies, means, and standard deviation).

3.14 Ethical Consideration

Ethics are crucial in scientific study. Ethics are the rules or standards that govern our conduct and interactions (Saunders, Lewis & Thornhill, 2007). An introductory was sent to the entities' authorities to request approval for the data collection exercise. The introduction letter described the study's objective and the relevance of performing the research. Before delivering the questionnaires, the authorities knew the study's goal. In the questionnaire introduction, a clause ensuring respondents' confidentiality was included. Participants were informed of the study's objectives and methodology. The participants were told that their answers would be treated with respect and kept confidential and that they were participating in a study that would only be used for academic purposes. They were disallowed from writing their names on the questionnaire to safeguard the participants' confidentiality. The possible benefits of the study to the participants were also explained. Participants were informed that they would not be compensated for their participation and might withdraw from the study. Finally, every relevant literature included in the study (whether paraphrased, summarised, or quoted) was properly cited to prevent plagiarism.

3.15 Chapter Summary

This chapter described and explained the research method and procedures employed in the study. The chapter discussed the research philosophy. The positivist research philosophy was used because of the nature of the research and the objectives.

The positivist philosophy believes in the objectivity of scientific inquiry. The study's research design was also discussed. Data collection procedures and statistical methods were described, and the research population and the sample were examined. Research instruments were evaluated for their validity and reliability. Statistical Package for Social Science (SPSS version 26.0) and the Smart PLS-SEM were powerful analytical instruments for reaching the study's primary objective. The ethical consideration was also discussed.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The study examined the impact of supply chain visibility on customer-oriented performance and the roles of supply chain collaboration and learning. Chapter four presents and discusses the findings. Descriptive statistics for various characteristics were analyzed and detailed in this chapter. The developed hypotheses were tested using Smart PLS-SEM. The analysis first covered the measurement criteria, followed by the structural model. The results and their discussions are provided in this section.

4.1 Response Rate

A total of 152 questionnaires were distributed across the manufacturing firms in the Greater Accra Region, Ghana. 117 responses were received, but three were incomplete and subsequently excluded from the analysis. Ultimately, 114 valid questionnaires were prepared for data entry and analysis. This results in a response rate of 75%, which is considered highly satisfactory for data analysis. The high response rate of 75% highlights the reliability of the data collected and the robustness of the findings derived from the analysis.

4.2 Demographics Characteristics of the Sample

This section describes the final sample and details the data sources (response/respondent characteristics). Various demographic characteristics, such as gender, age, level of education, number of years worked in their organization, and marital status, were analyzed and presented in Table 4.1.

Table 4.1: Demographic Information

Gender		Frequency	Percentage
Gender	Male	78	68.4
	Female	36	31.6
Age	25-30	35	30.7
	31-40	67	58.8
	41-50	9	7.9
	Above 50	3	2.6
Level of Education	HND/Diploma	18	15.8
	First Degree	49	43
	Masters Degree	47	41.2
	PhD		-
Number of years the firm has been in operation	Less than 1 year	21	18.4
	1-5 years	35	30.7
	6-10 years	18	15.8
	Above 10 years	40	35.1
Marital Status	Single	43	37.7
	Married	63	55.3
	Divorced	4	3.5
	Widowed	4	3.5
Total		114	100

Source: Field Survey (2024)

The demographic results provide significant insight into the composition of the sample group, helping to understand their characteristics and potential implications for the study. The gender disparity, with 68.4% male and 31.6% female, suggests that men dominate the workforce or participant pool, which could affect workplace dynamics, such as gender-specific roles, career advancement opportunities, and work-life balance. The age distribution, with the majority of respondents (58.8%) being between 31-40 years old, reflects a mid-career workforce likely to be at a more stable stage of professional development, while the smaller proportions of younger (25-30 years,

30.7%) and older (over 50 years, 2.6%) respondents suggest less representation from entry-level and senior employees. Education levels further reveal a highly qualified workforce, with 43% holding a First Degree and 41.2% holding a Master's Degree. The operational longevity of the firm, with 35.1% having existed for over 10 years, suggests a relatively established environment, while a significant 30.7% have been in operation between 1-5 years, highlighting a blend of both newer and older firms. Marital status data, where 55.3% are married, indicates a more settled demographic, possibly contributing to different perspectives on work-life balance and employee well-being compared to the 37.7% single.

4.3 Descriptive Statistics of the Constructs

The descriptive statistics table provides an overview of the data collected for four constructs: supply chain visibility, supply chain learning, supply chain collaboration and customer-oriented performance. Each construct is measured using multiple items on a 5-point scale. The study employed the mean, standard deviation, skewness and kurtosis to assess the constructs' descriptive. The findings are highlighted in Table 4.2.

Table 4.2: Descriptive Statistics

	Items	N	Min	Max	Mean	Std. Dev	Sk	Kt.
COP1	We successfully meet our customers' needs.	114	1	5	3.39	1.01	-0.23	0.304
COP2	We ensure timely delivery.	114	1	5	3.37	1.15	-0.05	-0.95
COP3	We respond swiftly to customer requirements.	114	1	5	3.22	1.16	0.16	-0.89
COP4	We maintain high service standards for customers.	114	1	5	3.15	1.29	-0.06	-1.14
COP5	Our customers are generally satisfied with our services.	114	1	5	3.33	1.25	0.02	-1.12
COP6	Our firm effectively retains customers.	114	1	5	3.09	1.26	-0.07	-0.95

COP7	Our customer base is expanding.	114	1	5	3.13	1.30	-0.21	-1.01
SCV1	We are able to communicate with supply chain partners regarding fluctuations in demand and alterations in customer preferences.	114	1	5	3.42	1.22	0.00	-1.20
SCV2	We share performance feedback with our supply chain partners.	114	1	5	3.49	1.13	0.17	0.78
SCV3	Our company involves stakeholders in making decisions about customer preferences and new product requirements.	114	1	5	3.55	1.06	-0.29	-0.95
SCV4	We consistently monitor inventory levels across the supply chain.	114	1	5	3.62	1.00	0.01	-1.00
SCV5	We gather information from various sources to gauge the market and prepare for seasonal fluctuations.	114	1	5	3.55	1.14	-0.30	-0.73
SL1	We prioritize ongoing learning among our managers to enhance customer service.	114	1	5	3.42	1.12	-0.14	-0.94
SL2	We encourage continuous improvement and learning among managers in our organizations to optimize operations and service	114	1	5	3.44	1.13	0.14	-1.25
SL3	We ensure that insights about the market and customers are disseminated throughout our supply chain organizations.	114	1	5	3.53	0.99	0.04	0.92
SL4	Our primary supplier delivers essential and valuable information that aids in product innovation.	114	1	5	3.57	1.16	-0.25	-0.92
SL5	Our company conducts systematic checks to confirm that the knowledge from our key	114	1	5	3.63	1.11	-0.30	-0.69

	customers is utilized effectively								
SL6	During product development, our company extensively learns from our key customers.	114	1	5	3.40	1.12	0.04	-0.88	
SL7	Our company receives extensive production information from our key customers.	114	1	5	3.28	1.26	-0.25	-0.88	
SS1	We engage in collaborative decision-making with our partners	114	1	5	3.45	1.11	-0.01	-1.02	
SS2	Our firm and supply chain partners jointly strategize to meet supply chain objectives.	114	1	5	3.43	1.09	-0.18	0.66	
SS3	Our firm and supply chain partners cooperatively manage costs, risks, and rewards.	114	1	5	3.36	1.10	0.04	-0.70	
SS4	We address customer feedback and resolve complaints collectively.	114	1	5	3.30	1.19	-0.28	-0.74	
SS5	There is mutual trust among members of our supply chain.	114	1	5	3.51	1.17	-0.17	-1.00	

Source: Field Survey (2024)

The results in Table 4.2 indicate varying levels of effectiveness in customer-oriented performance (COP), supply chain visibility (SCV), strategic learning (SL), and supply chain strategic alignment (SS). Across customer-oriented performance (COP), the mean values range from 3.09 to 3.39, suggesting moderate agreement with the statements related to customer satisfaction, timely delivery, and service standards. The lowest mean score (3.09) pertains to customer retention, while the highest (3.39) reflects the firm's ability to meet customer needs. This indicates that while the company generally meets customer demands, there may be challenges in retaining customers and maintaining consistently high service standards. The negative skewness values across most COP items suggest that responses are slightly more concentrated towards the

higher end of the scale, indicating some overall satisfaction, though with room for improvement.

For supply chain visibility (SCV), the results show relatively strong performance, with mean scores ranging from 3.42 to 3.62. The highest mean (3.62) pertains to monitoring inventory levels, which indicates that the company is actively managing supply chain activities. Additionally, the ability to communicate with partners regarding market changes (mean of 3.42) and sharing performance feedback (mean of 3.49) are also perceived positively. The negative kurtosis values, especially for SCV1 and SCV4, suggest a broad distribution of responses, which may indicate varied experiences among respondents concerning how effectively the company manages communication and monitoring across the supply chain. These results reflect a well-integrated and responsive supply chain but highlight potential inconsistencies in how stakeholders experience this integration.

Supply chain learning (SL) and supply chain strategic alignment (SS) results are also positive, with mean values generally above 3.4. The highest mean in SL (3.63) pertains to utilizing knowledge from key customers, demonstrating that the company values customer feedback for continuous improvement and product development. However, there is still variation in how consistently knowledge dissemination occurs throughout the supply chain (mean of 3.53) and how customer learning influences product innovation (mean of 3.57). In terms of strategic alignment (SS), the firm appears to prioritize collaborative decision-making (mean of 3.45) and trust among supply chain members (mean of 3.51). However, cost, risk, and reward management (mean of 3.36) could be further optimized through closer cooperation with supply chain partners.

4.4 Measurement Model Specification

The model specification illustrated in Figure 4.1 represents a structural equation model with four key latent variables: supply chain visibility, supply chain learning, supply chain collaboration and customer-oriented performance. The study used twenty-five (25) indicators to draw the model. The individual indicators are represented in yellow rectangles, and the main constructs are depicted in blue ovals, as shown in Figure 2. Multiple indicators measure each latent variable, denoted as SCV1 to SCV5 for supply chain visibility, SL1 to SL7 for supply chain learning, SS1 to SS6 for supply chain collaboration, and COP1 to COP7 for customer-oriented performance. The arrows connecting these indicators to their respective latent variables signify that these are reflective measurement models, where the latent variables are hypothesized to cause the observed indicators.

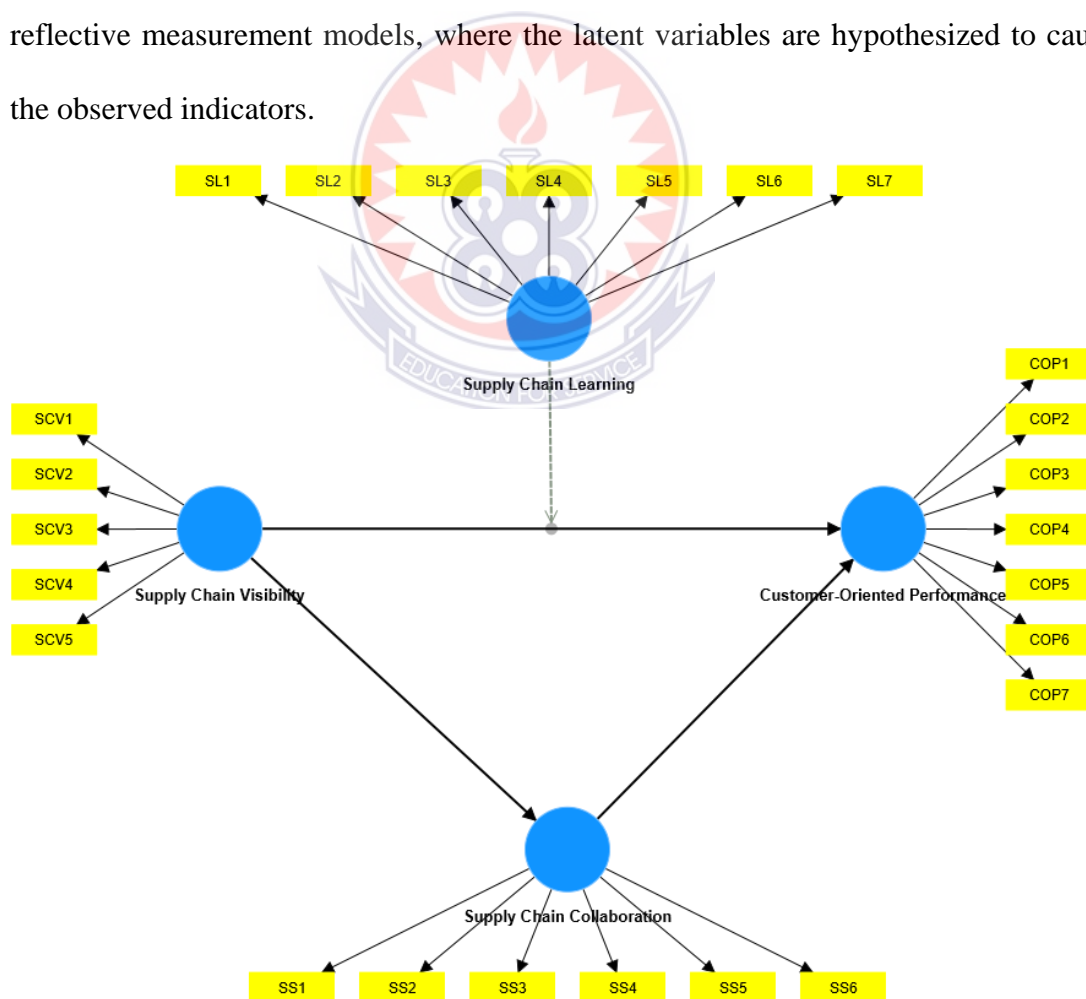


Figure 4.2: Specification Model

4.5 Measurement Model Assessment

Measurement assessment in PLS-SEM involves evaluating the reliability and validity of the measurement model, which consists of reflective and formative indicators. For reflective measurement models, the assessment focuses on indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. The study assessed the model measurement by evaluating its reflective indicators. Model assessment is a crucial statistical procedure to validate the measurement model before testing the structural model (Hair et al., 2016). Specifically, the measurement model assessment involves validating indicator loadings, construct reliability, convergent validity, and discriminant validity. The study applied the Cronbach's alpha and composite reliability to ensure internal consistency. Additionally, indicator loadings and average variance extracted (AVE) were employed to test for convergent validity (Hair et al., 2016). Henseler, Ringle, and Sarstedt (2015) recommend using the Heterotrait-Monotrait Ratio (HTMT), Fornell-Larcker criterion, and cross-loadings for discriminant validity. This study specifically used the HTMT criterion due to its robustness compared to cross-loadings and the Fornell-Larcker criterion for validating discriminant validity (Henseler et al., 2015; Hair et al., 2016).

4.6 Internal Consistency Reliability and Convergent Validity Assessment

The study examined the indicator loadings for all constructs, adhering to the recommendation that each item (indicator) should exhibit a loading of 0.708 or higher. This standard ensures that the construct proxy accounts for at least 50% of the variance in each item (Hair et al., 2018). The results are highlighted in Table 4.3. Following the validation of indicator loadings, the study assessed internal consistency reliability. Internal consistency reliability measures how well a set of indicators consistently represents the underlying construct. Composite reliability and Cronbach's alpha were

employed for the assessment. Using these two measures is essential because Cronbach's alpha underestimates reliability, while composite reliability overestimates it. Together, they provide the lower and upper bounds of the true composite reliability, respectively (Hair et al., 2022). For internal consistency reliability to be considered acceptable, these measures should have a minimum value of 0.7 (Hair & Sarstedt, 2019).

Table 4.3: Indicator Loading, Construct Reliability and Validity

	Loadings	Cronbach Alpha	Composite Reliability	AVE
Customer Oriented Performance		0.910	0.929	0.652
COP1	0.748			
COP2	0.769			
COP3	0.865			
COP4	0.787			
COP5	0.860			
COP6	0.815			
COP7	0.799			
Supply Chain Visibility		0.895	0.922	0.704
SCV1	0.826			
SCV2	0.867			
SCV3	0.831			
SCV4	0.819			
SCV5	0.851			
Supply Chain Learning		0.901	0.922	0.629
SL1	0.833			
SL2	0.756			
SL3	0.789			
SL4	0.782			
SL5	0.716			
SL6	0.859			
SL7	0.809			

Supply Chain Collaboration	0.887	0.914	0.640
SS1	0.770		
SS2	0.804		
SS3	0.790		
SS4	0.812		
SS5	0.801		
SS6	0.821		
Supply Chain Learning x Supply Chain Visibility	1.000		

Source: Field Survey (2024)

Table 4.3 presents the reliability and validity metrics of constructs related to a study on supply chain management, which include Customer Oriented Performance (COP), Supply Chain Visibility (SCV), Supply Chain Learning (SL), and Supply Chain Collaboration (SS), along with an interaction term between Supply Chain Learning and Supply Chain Visibility. For the constructs, Cronbach's Alpha and Composite Reliability indicate high internal consistency, as values are well above the acceptable threshold of 0.70. This suggests that the items within each construct consistently measure the same concept. On the other hand, the average variance extracted (AVE) for each construct also meets the acceptable threshold of 0.50 (except for COP, which is slightly above at 0.652, SCV at 0.704, and slightly lower values for SL at 0.629 and SS at 0.640), indicating that a majority of the variance in the observed variables is accounted for by the construct they are intended to measure. The result highlighted in Table 4.3 shows that all item loadings are above 0.70, which is considered excellent, signifying strong individual contributions to their respective constructs. Specifically, COP items range from 0.748 to 0.865, SCV items from 0.819 to 0.867, SL items from 0.716 to 0.859, and SS items from 0.770 to 0.821. The result shows that the model is valid and reliable.

4.7 Discriminant Validity Assessment

Discriminant validity refers to the extent to which a construct is truly distinct from other constructs by empirical standards. In other words, discriminant validity ensures a construct is unique and captures phenomena that other constructs in the model do not. This is crucial for establishing the construct's validity and ensuring that the results of the SEM analysis are reliable and meaningful (Hair et al., 2016). There are several methods to assess discriminant validity. However, this study applied the Heterotrait-Monotrait ratio (HTMT) to test for discriminant validity because of its robustness compared to Fornell Lacker and cross-loadings (Henseler et al., 2015). HTMT is considered a more reliable criterion for assessing discriminant validity and involves calculating the ratio of between-trait correlations to within-trait correlations. An HTMT value below 0.85 and 0.90 suggests good discriminant validity for distinct and similar constructs. Ensuring discriminant validity is essential because it confirms that the constructs in the model are distinct and not merely reflections of each other. This distinction allows researchers to make more accurate inferences about the relationships between constructs and better understand each construct's unique contributions to the overall model (Henseler et al., 2015; Hair et al., 2016). The result is highlighted in Table 4.4.

Table 4.4: Discriminant Validity (HTMT)

	1	2	3	4	5
Customer-Oriented Performance (1)					
Supply Chain Collaboration (2)	0.795				
Supply Chain Learning (3)	0.827	0.831			
Supply Chain Visibility (4)	0.791	0.825	0.812		
Supply Chain Learning x Supply Chain Visibility (5)	0.353	0.202	0.332	0.136	

Source: Field Survey (2024)

The result in Table 4.4 indicates good discriminant validity among the constructs (customer-oriented performance, supply chain collaboration, supply chain learning, and supply chain visibility). All HTMT values between these constructs are below the commonly accepted threshold of 0.850, ranging from 0.791 to 0.831. This supports the conclusion that each construct distinctly measures different aspects of supply chain management without significant overlap. Additionally, the interaction term, Supply Chain Learning x Supply Chain Visibility, shows particularly low HTMT values (ranging from 0.136 to 0.353) compared to the other constructs. This significant difference highlights that the interaction term captures a unique and additive aspect of the model, substantially distinct from the effects captured by the individual constructs of learning and visibility. The result confirms that all the constructs are distinct and have adequate discriminant validity.

4.8 Structural Model Assessment

After validating the reliability (internal consistency) and validity (convergent and discriminant) of the measurement model, the study assessed the structural model to accurately predict the relationships between exogenous, moderating, and endogenous constructs. According to Hair et al. (2016), a structured approach should be used to analyze the outcomes within the structural model in PLS-SEM, emphasizing its predictive efficiency and the relationships among variables. The study first analyzed collinearity issues, ensuring no significant multicollinearity was present. It then examined the significance and relevance of the relationships within the structural model, evaluating the strength and direction of the hypothesized paths. Further, the study evaluated the coefficient of determination (R^2) to determine the proportion of variance explained by the exogenous variables. Additionally, the F^2 effect size was

examined to assess the impact of each predictor construct on the endogenous constructs, and the Q^2 effect size was measured to evaluate the model's predictive relevance.

4.9 Collinearity Assessment

Collinearity assessment is critical in evaluating structural models using Partial Least Squares Structural Equation Modeling (PLS-SEM). Collinearity occurs when two or more predictor variables in a model are highly correlated, leading to redundancy and potentially unstable estimates of regression coefficients (Cheah et al., 2023). In PLS-SEM, collinearity assessment is essential to ensure the robustness and reliability of the model's results. High collinearity can inflate standard errors and make it difficult to determine the individual effect of each predictor variable on the endogenous constructs (Hair et al., 2019). To assess collinearity, researchers typically examine the Variance Inflation Factor (VIF) values, with a standard threshold being a VIF value below 3.3, indicating acceptable collinearity levels (Knock, 2015). Addressing collinearity issues helps refine the model and ensure that the structural paths are accurately estimated, leading to more reliable and valid conclusions. Proper collinearity assessment enhances the interpretability of the model and supports the validity of the theoretical relationships being tested. The results of the VIF values are presented in Table 4.5.

Table 4.5: Multicollinearity Statistics

	VIF
Supply Chain Collaboration -> Customer-Oriented Performance	2.595
Supply Chain Learning -> Customer-Oriented Performance	3.683
Supply Chain Visibility -> Customer-Oriented Performance	3.387
Supply Chain Visibility -> Supply Chain Collaboration	1.000
Supply Chain Learning x Supply Chain Visibility -> Customer-Oriented Performance	1.173

Source: Field Survey (2024)

The result shown in Table 4.5 shows the VIF values for all the constructs. The result proved that all VIF values are below 5, with the highest being 3.683 for the relationship between "Supply chain learning and Customer-oriented performance." Specifically, the paths from Supply Chain Collaboration, Supply Chain Learning, and Supply Chain Visibility to Customer-Oriented Performance exhibit VIFs of 2.595, 3.683, and 3.387, respectively, all of which are well below the threshold, indicating no concerning multicollinearity issues and suggesting that these predictors can reliably be used in the model without distortion from excessive inter-correlations. These VIF values collectively affirm that the model is robust concerning the independence of variables, thereby enhancing the validity of the regression results.

4.10 Coefficient of Determination (R^2)

When collinearity is non-problematic, the subsequent step involves evaluating the R^2 value for the endogenous variables. The R^2 is a crucial metric to assess the model's explanatory power. R^2 represents the proportion of variance in the dependent (endogenous) variable that can be explained by the independent (exogenous) variables (Shmueli & Koppius, 2011). Higher R^2 values indicate that the exogenous variables account for a greater variance in the endogenous variable, reflecting a better model fit. This metric is crucial as it helps researchers understand the strength and significance of the relationships between constructs within the model, thereby providing insights into its predictive accuracy (Hair, Hult, Ringle, & Sarstedt, 2016). Analyzing R^2 values allows for a comprehensive evaluation of how well the theoretical framework fits the observed data, which is essential for validating the proposed hypotheses and ensuring the robustness of the research findings. The results of the R^2 values are shown in Table 4.6.

Table 4.6: R-squared

	R-square	R-square adjusted
Customer-Oriented Performance	0.667	0.662
Supply Chain Collaboration	0.552	0.550

Source: Field Survey (2024)

The R-squared and Adjusted R-squared values in Table 4.6 reflect the proportion of variance explained by the independent variables in two different regression models. For Customer-Oriented Performance, the R-squared value of 0.667 suggests that approximately 66.7% of the variance in this dependent variable is explained by supply chain visibility, supply chain collaboration and supply chain learning, which is a strong explanatory power. The Adjusted R-squared, slightly lower at 0.662, accounts for the number of predictors in the model and suggests a similarly strong fit, indicating that the model generalizes well despite the number of variables involved. For Supply Chain Collaboration, the R-squared value is 0.552, indicating that 55.2% of its variance is explained by supply chain visibility, with an Adjusted R-squared of 0.550, which again is close to the R-squared value and confirms that the model is robust with minimal overfitting due to excessive predictors. These values imply that both models effectively explain a significant portion of the variance in the respective outcomes, thus demonstrating good predictive capabilities.

4.11 Effect Size (F2) Assessment

Effect size assessment is crucial for understanding the practical significance of relationships between constructs within the model. Effect size, typically measured by Cohen's f^2 , indicates the impact of a specific exogenous variable on an endogenous variable by quantifying the change in the coefficient of determination (R^2) when the exogenous variable is included or excluded from the model (Hair et al., 2020). An f^2 value of 0.02, 0.15, and 0.35 suggests small, medium, and large effects, respectively

(Cohen, 1988). Assessing effect size is important because it provides deeper insights into the strength and relevance of predictor variables beyond mere statistical significance, helping researchers to identify which variables have the most substantial impact on the model's outcomes (Hair, Hult, Ringle, & Sarstedt, 2016).

Table 4.7: F-Squared

	f-square
Supply Chain Collaboration -> Customer-Oriented Performance	0.091
Supply Chain Learning -> Customer-Oriented Performance	0.067
Supply Chain Visibility -> Customer-Oriented Performance	0.064
Supply Chain Visibility -> Supply Chain Collaboration	1.233
Supply Chain Learning x Supply Chain Visibility -> Customer-Oriented Performance	0.061

Source: Field Survey (2024)

The f-square values presented in the table (see Table 4.7) are used to evaluate the effect size of predictor variables on dependent variables in a structural equation model. The result highlights that the effects of Supply Chain Collaboration, Supply Chain Learning, and Supply Chain Visibility on Customer-Oriented Performance are small, with f-square values of 0.091, 0.067, and 0.064, respectively. This indicates that while each has a statistically significant impact, the strength of these individual impacts is modest. The interaction term, Supply Chain Learning x Supply Chain Visibility, also shows a small effect size on Customer-Oriented Performance, with an f-square of 0.061, suggesting a slight but meaningful contribution to explaining the variance in Customer-Oriented Performance. Contrastingly, the effect of Supply Chain Visibility on Supply Chain Collaboration is substantial, with an f-square value of 1.233, indicating a large and significant influence, highlighting the critical role of visibility within the dynamics of supply chain collaboration. This pattern suggests that while individual supply chain

functions modestly contribute to performance outcomes, visibility is pivotal in enhancing collaborative efforts within the supply chain.

4.12 Predictive Relevance (Q²) Assessment

Another key indicator for evaluating predictive accuracy is the Q² value, often associated with the blindfolding technique (Geisser, 1974; Stone, 1974). Q² measures how well the model can predict the data points of the endogenous constructs, indicating its out-of-sample predictive power. A model demonstrates predictive relevance if the Q² value is greater than zero, suggesting that the model can predict the endogenous variables based on the exogenous variables (Hair et al., 2020). This assessment is crucial because it not only confirms the explanatory power of the model (as indicated by R²) but also ensures that the model can generalize beyond the sample used for estimation, thus enhancing its practical applicability and reliability (Hair, Hult, Ringle, & Sarstedt, 2016). By incorporating Q² assessment, researchers can verify that their models are theoretically sound and practically helpful in predicting future observations, making it an indispensable component of model evaluation in PLS-SEM. The output of the Q² is highlighted in Table 4.8.

Table 4.8: PLS Predict

	Q ² predict	RMSE	MAE
Customer-Oriented Performance	0.600	0.636	0.453
Supply Chain Collaboration	0.547	0.678	0.555

Source: Field Survey (2024)

The Q²predict values (see Table 4.8), which indicate the model's predictive relevance, are 0.600 for Customer-Oriented Performance and 0.547 for Supply Chain Collaboration. These values are above 0, suggesting the models possess good out-of-sample predictive power for both constructs. The Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) provide measures of the average error magnitude in

predictions, with lower values indicating better predictive accuracy. For Customer-Oriented Performance, the RMSE is 0.636 and the MAE is 0.453, indicating that the model predicts this construct with moderate accuracy. Similarly, the RMSE is 0.678 for supply chain collaboration, and the MAE is 0.555, which shows slightly less predictive accuracy than customer-oriented performance. The metrics suggest that the models can predict the constructs accurately and reasonably.

4.13 Assessment of Path Coefficients and Significance Level

Once the measurement model was confirmed to meet the requirements established by PLS-SEM, all study hypotheses were evaluated. This evaluation involved examining the direction and magnitude of relationships using path coefficients. The significance levels were determined using t-statistics derived from 10000 bootstrap samples, following a 2-tailed test recommended by Hair et al. (2014). According to the established standards, a hypothesis is considered statistically significant if the t-statistics exceed the threshold of 1.96 and the p-values are below 0.05. The results from applying Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis to the five hypotheses aligned with the research objectives are detailed in Table 4.9.

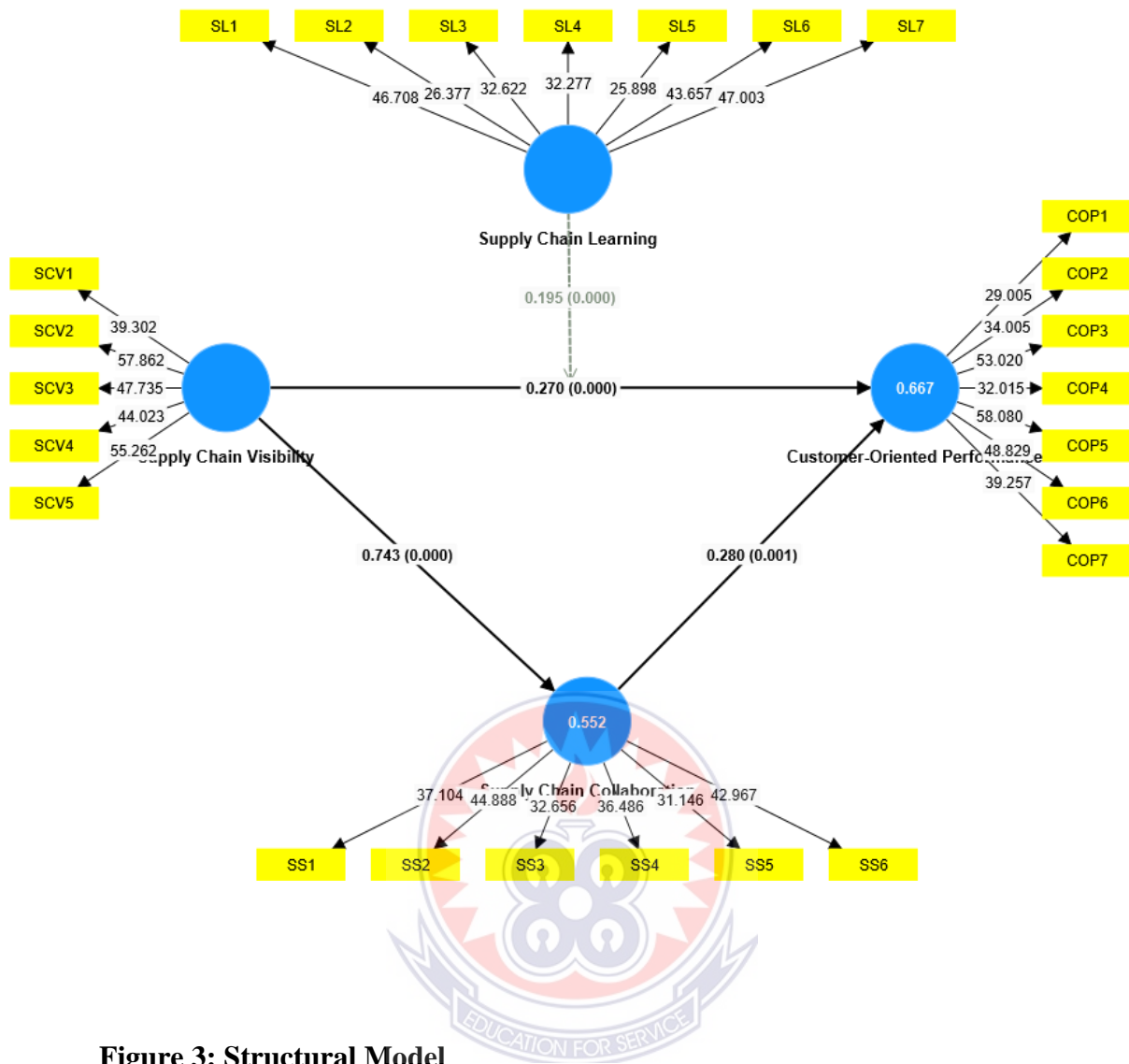


Figure 3: Structural Model

Table 4.9: Hypothesis Testing

	Hypothesis	β	M	STDE V	T stat.	P values
H1	Supply Chain Visibility -> Customer-Oriented Performance	0.270	0.265	0.068	3.948	0.000
H2	Supply Chain Visibility -> Supply Chain Collaboration	0.743	0.743	0.029	25.948	0.000
H3	Supply Chain Collaboration -> Customer-Oriented Performance	0.280	0.280	0.088	3.186	0.001
Mediation						
H4	Supply Chain Visibility -> Supply Chain Collaboration -> Customer-Oriented Performance	0.208	0.209	0.067	3.109	0.002
H5	Supply Chain Learning x Supply Chain Visibility -> Customer-Oriented Performance	0.195	0.195	0.034	5.783	0.000

Source: Field Survey (2024)

The results from the PLS analysis highlight the significant paths within the structural model, indicating how various supply chain processes influence Customer-Oriented Performance. The results highlighted in Table 4.9 show that the direct effects of Supply Chain Collaboration, Supply Chain Learning, and Supply Chain Visibility on Customer-Oriented Performance are all statistically significant, with β values of 0.280, 0.286, and 0.270, respectively and p-values (≤ 0.005). The respective T-statistics (3.186, 3.823, and 3.948) further affirm the strength and reliability of these relationships. These findings suggest that improvements in collaboration, learning, and visibility within the supply chain are positively associated with better customer-oriented outcomes, emphasizing the importance of these supply chain components in enhancing overall performance.

Additionally, Supply Chain Visibility strongly affects Supply Chain Collaboration, with a β value of 0.743 and a T-statistic of 25.948, indicating a highly significant and robust relationship. This underscores the vital role of visibility in facilitating effective collaboration among supply chain participants. In terms of

moderation, the interaction term (Supply Chain Learning x Supply Chain Visibility) significantly influences Customer-Oriented Performance ($\beta = 0.195$, T-stat = 5.783, $p = 0.000$), suggesting that the combined effect of supply chain learning and visibility significantly enhances performance outcomes, beyond their contributions. Lastly, the mediation analysis indicates a significant indirect effect of Supply Chain Visibility on Customer-Oriented Performance through Supply Chain Collaboration ($\beta = 0.208$, T-stat = 3.109, $p = 0.002$), which means Supply Chain Collaboration partially mediates the relationship between Supply Chain Visibility and Customer-Oriented Performance, further highlighting the interconnected nature of these supply chain processes.

4.14 Slope Analysis

The graph depicts the interaction between supply chain learning and supply chain visibility in influencing supply chain performance. The x-axis represents customer-oriented performance, while the y-axis measures supply chain visibility. The graph features three lines, each representing different levels of supply chain learning: one standard deviation below the mean (red line), at the mean (blue line), and one standard deviation above the mean (green line).

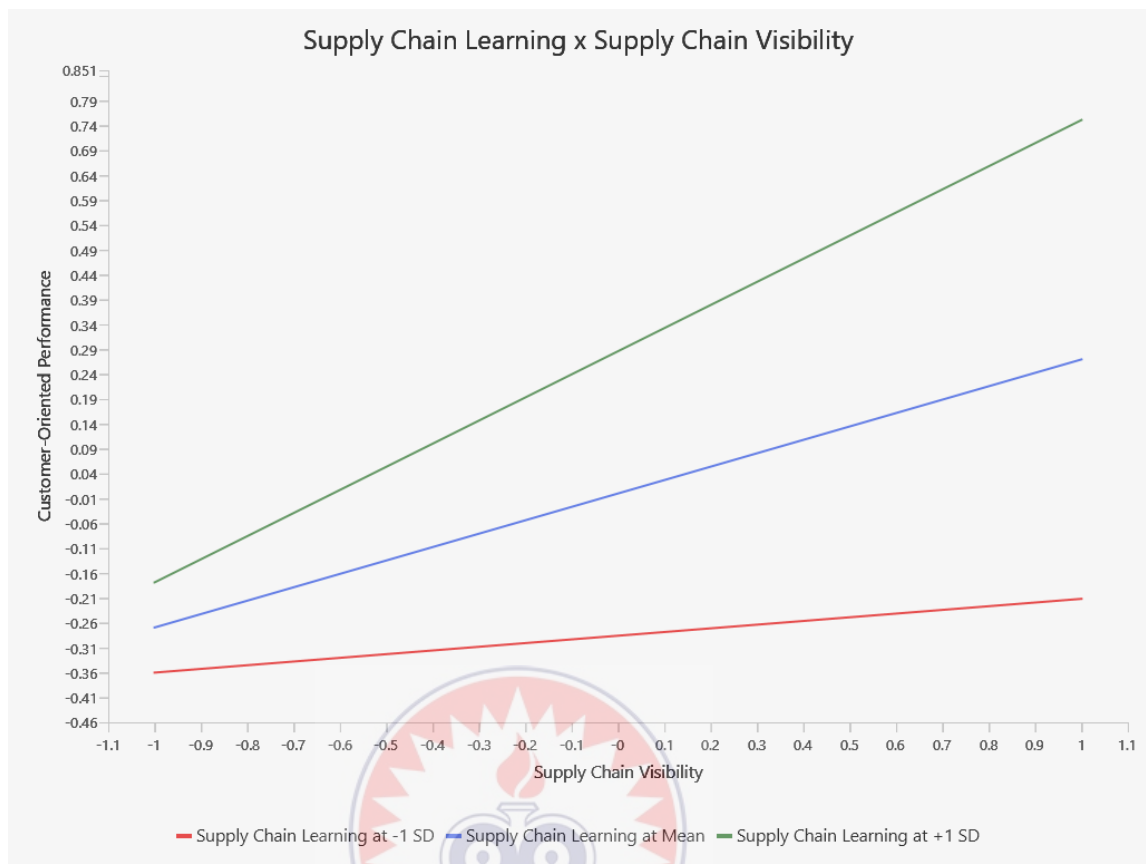


Figure 4: Slope Analysis

The graph (see Figure 3) illustrates how the relationship between supply chain visibility and customer-oriented performance is moderated by supply chain learning. At lower levels of supply chain learning (-1 SD, represented by the red line), the impact of increasing supply chain visibility on customer-oriented performance is minimal. This suggests that when firms do not effectively engage in learning within their supply chains, improvements in visibility alone do not significantly enhance customer-oriented outcomes. The slope of the red line is quite flat, implying that visibility gains are not enough to drive meaningful performance improvements under these conditions. Conversely, as supply chain learning increases (mean level in blue and +1 SD in green), the positive effect of supply chain visibility on customer-oriented performance becomes more pronounced. The green line, representing high levels of supply chain learning (+1

SD), shows a steep incline, indicating that firms with robust learning capabilities can leverage visibility enhancements to achieve significantly better customer-oriented outcomes. This demonstrates that supply chain learning enhances the firm's ability to capitalize on visibility, making it a critical enabler for performance improvement. Thus, the interaction between visibility and learning is crucial for firms seeking to improve customer-focused results.

4.15 Discussion of Results

The results are discussed based on the research objectives.

Objective 1: Supply chain visibility and customer-oriented performance.

The study examined the relationship between supply chain visibility and customer-oriented performance. The results proved a positive and significant relationship. The result indicates that increased transparency and accessibility of information within the supply chain contribute to enhanced performance focused on customer needs and expectations. This positive relationship suggests that when supply chain operations are visible and transparent, they enable better decision-making, more efficient operations, and improved customer service. This is directly linked to an organization's ability to meet customer demands and enhance overall satisfaction. The findings align with the resource-based view theory and extant studies. The RBV theory provides a valuable theoretical backdrop to understanding how supply chain visibility (resource) can enhance customer-oriented performance.

On the other hand, the findings from other studies consistently emphasise the strategic importance of supply chain visibility (SCV) in enhancing performance and responsiveness across diverse sectors. For instance, the research conducted by Asamoah, Asare-Bediako, and Jacqueline (2023) on the Ghana Health Service revealed that increased SCV leads to significant improvements in supply chain performance.

This result aligns well with the outcomes from Baah, Acquah, and Ofori (2021), who found that improved visibility boosts financial and environmental outcomes and fosters stronger stakeholder trust within the supply chain. Similarly, Singagerda, Fauzan, and Desfiandi (2021), in their study on Indonesian logistics firms, reported that SCV has a considerable positive impact on business performance, supporting the notion that effective information dissemination is crucial for operational success. These empirical findings suggest that SCV is a critical enabler of better coordination, faster decision-making, and more effective risk management. Further corroborating this perspective, Dubey, Gunasekaran, and Roubaud (2020) identified that SCV, particularly in complex manufacturing contexts in India, enhances a company's ability to perform sustainably. This enhancement is significantly influenced by how visibility interacts with product complexity, facilitating more effective resource and capability management toward improved social, environmental, and economic outcomes. The consistent theme across these studies highlights SCV's pivotal role in strengthening and enhancing customer-oriented performance in a dynamic supply chain.

Objective 2: Supply chain visibility on supply chain collaboration.

The study's second objective is to examine the effect of supply chain visibility on supply chain collaboration. The results proved a positive and significant relationship. The study's findings suggest that enhanced transparency within the supply chain fosters better collaborative practices among partners. This relationship indicates that when organizations have greater access to real-time data and information flows, they are better equipped to coordinate actions, align strategies, and effectively manage interdependencies with other supply chain members. This increased visibility enables partners to anticipate needs, adjust to changes swiftly, and execute joint decisions more confidently and efficiently. This result supports the broader understanding within

supply chain management that visibility is a foundational element in building robust collaborative relationships, essential for achieving competitive advantages in today's complex market environments.

Empirical studies consistently highlight the transformative impact of supply chain visibility (SCV) on enhancing collaboration and overall supply chain performance. For instance, research by Baah et al. (2021) emphasizes the significant role of SCV in promoting stakeholder trust and improving environmental and financial outcomes, reinforcing the notion that visibility acts as a linchpin in fostering effective supply chain collaboration. This is corroborated by additional findings from the same researchers, who illustrate that information sharing a key component of SCV not only boosts visibility but also enhances agility and overall performance across the supply chain (Baah et al., 2021). These empirical results validate the critical role of SCV in creating a more integrated, responsive, and efficient supply chain ecosystem, where informed decision-making leads to optimized operational outcomes and stronger competitive positioning.

Theoretically, these findings align well with the firm's Resource-Based View (RBV), which posits that unique internal capabilities such as SCV can create sustainable competitive advantages. SCV, considered a valuable and rare resource under RBV, provides firms with the capability to access and utilize real-time data across the supply chain, enhancing their ability to respond swiftly to market changes and coordinate more effectively with supply chain partners (Barney, 1991; Wernerfelt, 1984). Consequently, firms that invest in and develop robust SCV capabilities are better positioned to leverage these resources for strategic advantage, leading to improved operational efficiencies, reduced costs, and enhanced customer satisfaction. Thus, SCV

embodies the principles of RBV by offering firms a distinct resource that enables them to outperform competitors who lack similar visibility (Barney, 1991; Wernerfelt, 1984).

Objective 3: Supply chain collaboration on customer-oriented performance.

The third objective examined the effect of supply chain collaboration on customer-oriented performance. The result shows that supply chain collaboration positively and significantly enhances customer-oriented performance. This finding suggests that when manufacturing firms effectively collaborate with their supply chain partners, such as sharing information, aligning operational goals, and coordinating processes, they can better meet customer demands with greater efficiency and precision. Enhanced collaboration leads to improved logistics, consistent quality control, and faster response times, crucial for boosting customer satisfaction and loyalty. By integrating and optimizing supply chain collaboration, manufacturing firms can streamline operations and enhance their capability to deliver value to customers, directly influencing their competitive advantage in the market.

Empirical studies demonstrate that effective supply chain collaboration (SCC) significantly enhances firm performance across various industries and contexts. For instance, Billah et al. (2023) illustrated that in the Ready-Made Garment sector in Bangladesh, integrating collaborative practices and ethical sensitivity improves performance outcomes. Similarly, Zardis et al. (2020) found that SCC positively influenced performance in the agri-food sector among SMEs. Panahifar et al. (2018) also highlighted the importance of trust and secure information sharing as enablers of successful collaboration, significantly boosting organizational performance. These studies collectively affirm that SCC is beneficial and critical for enhancing customer-oriented performance among manufacturing firms.

On the other hand, the theoretical underpinnings of these empirical findings can be well explained through the firm's Resource-Based View (RBV), which posits that strategic internal resources are key to building competitive advantages. Supply chain collaboration is viewed as a strategic resource that, when effectively managed, leads to superior performance outcomes. SCC facilitates resource integration and efficient utilization across the supply chain, enhancing flexibility, responsiveness, and overall operational efficiency (Chen et al., 2017; Liao et al., 2017). Furthermore, by fostering a collaborative environment, firms can leverage collective capabilities and insights, enhancing innovation and performance (customer-oriented performance) (Barney, 1991). This collaborative approach optimizes individual firm performances and strengthens the supply chain, creating a robust framework that supports sustainable competitive advantage and aligns with the dynamic capabilities needed in rapidly evolving markets (Teece et al., 1997; Um & Kim, 2019). Thus, the RBV provides a compelling theoretical rationale for the strategic focus on SCC as a critical driver of firm and supply chain success.

Objective 4: The mediating role of supply chain collaboration on the nexus between supply chain visibility and customer-oriented performance.

The fourth objective assessed the mediating effect of supply chain collaboration on the relationship between supply chain visibility and customer-oriented performance. The findings revealed that supply chain collaboration partially mediates the nexus between supply chain collaboration and customer-oriented performance in the manufacturing sector. The result highlights that although supply chain visibility characterized by real-time data access and transparent operations boosts performance, collaborative actions like joint planning and shared problem-solving are fully leveraged to enhance outcomes that directly impact the customer. This demonstrates how

visibility sets the foundation, while collaboration actively utilizes this foundation to drive significant improvements in customer-oriented performance. Essentially, visibility provides the necessary information and insight. However, collaborative processes effectively apply this information to enhance responsiveness, customize offerings, and drive superior customer-oriented performance. This finding emphasises the synergistic effect of combining visibility with active collaboration to maximize the impact on customer satisfaction and operational success within the manufacturing industry. The findings resonate with the RBV, which posits that the strategic management of resources, including fostering trust and sharing of real-time data, is crucial for transforming these resources into a competitive advantage and performance (Barney, 1991).

Examining the mediating role of supply chain collaboration between supply chain visibility and customer-oriented performance adds a layer to understanding how information flows and collaborative strategies interact to enhance business outcomes. While there is a dearth of direct research on this mediating role, analogous studies offer compelling insights. For instance, research by Shafique et al. (2024) and Zhou et al. (2023) suggests that collaboration is pivotal in translating technological capabilities and managerial strategies into enhanced performance outcomes. These studies underline that while technological and informational resources (such as big data analytics and inter-organizational systems) are foundational, their effective utilization in improving performance is significantly amplified through collaborative practices. This is supported by Nwagwu et al. (2023), who found that artificial intelligence boosts supply chain performance notably when integrated with collaborative practices.

Objective 5: The moderating role of supply chain learning on the nexus between supply chain visibility and customer-oriented performance.

The study examined the moderating effect of supply chain learning on the relationship between supply chain visibility and customer-oriented performance. The study's findings suggest that the benefits derived from enhanced visibility, such as improved access to real-time data and greater operational transparency, are significantly amplified when coupled with effective learning mechanisms within the supply chain. Essentially, supply chain learning, characterized by the continuous acquisition, sharing, and application of knowledge, enables organizations to more effectively interpret and utilize the available information through increased visibility. This leads to better-informed decisions and more adaptive strategies directly aligned with customer needs and preferences. Thus, supply chain learning not only enhances the impact of visibility on performance but also ensures that the performance improvements are sustainable and dynamically aligned with evolving market demands, thereby driving more profound and effective customer-oriented outcomes.

Theoretically, this moderation effect resonates with the principles of Organizational Learning Theory (OLT), which posits that learning is a critical process through which organizations convert information into actionable intelligence (Argyris & Schön, 1978; Senge, 1990). OLT suggests that the efficacy of supply chain visibility in enhancing customer-oriented performance is contingent upon the organization's ability to learn from and act upon the information uncovered. This theoretical view is supported by the dynamic model of organizational learning proposed by Crossan, Maurer, and White (2011), which emphasizes the iterative processes of intuiting, interpreting, integrating, and institutionalizing knowledge. Therefore, the moderating role of supply chain learning is not just a facilitator but a crucial multiplier of the

benefits derived from enhanced visibility, enabling organizations to leverage real-time insights into significant performance enhancements aligned with customer demands.

The findings align with other studies. For instance, Yang et al. (2023) demonstrated that organizational learning capabilities amplify the benefits of sustainable supply chain initiatives, improving sustainability performance by enabling more effective adaptation to environmental demands. Li et al. (2022) confirmed through a meta-analysis that supply chain learning significantly boosts performance at both the firm and supply chain levels, with variations in impact depending on the type of knowledge and learning mode employed. Guo et al. (2020) illustrated that learning facilitates the translation of strategic orientations into practical innovations. Similarly, Huo et al. (2021) found that enhanced information sharing catalyzes learning processes, improving supply chain flexibility and responsiveness. These studies highlight the transformative potential of supply chain learning as a core driver of operational efficiency, adaptability, and competitive advantage in today's dynamic market environments.

Chapter Summary

Chapter Four of the study focuses on the results and discussions of the data analysis regarding the impact of supply chain visibility on customer-oriented performance, with the roles of supply chain collaboration and learning also explored. The chapter presents the sample's demographic characteristics and descriptive statistics of the key constructs measured, including supply chain visibility, learning, collaboration, and customer performance. Using Smart PLS-SEM, the hypotheses were tested, and the measurement model's validity and reliability were confirmed. The structural model analysis demonstrated significant relationships between supply chain visibility, collaboration, and customer-oriented performance, showing that

collaboration partially mediates the effect of visibility on performance. Additionally, the moderating role of supply chain learning was found to enhance the impact of visibility on customer outcomes, aligning with the resource-based view theory and supporting the importance of transparency, collaboration, and learning in achieving better customer-oriented results.



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The study examines the effect of supply chain visibility on supply chain performance and the roles of supply chain learning and collaboration. The concluding chapter summarises the findings presented in the preceding chapter and discusses the conclusions from the various hypotheses tested. Lastly, some recommendations are offered in light of the study's findings.

5.1 Summary of Findings

Five objectives guided the study. The objectives include:

1. To assess the effect of supply chain visibility on customer-oriented performance.
2. To examine the effect of supply chain visibility on supply chain collaboration.
3. To assess the effect of supply chain collaboration on customer-oriented performance.
4. To examine the mediating role of supply chain collaboration on the nexus between supply chain visibility and customer-oriented performance.
5. To investigate the moderating role of supply chain learning on the nexus between supply chain visibility and customer-oriented performance.

The study adopts a positivist approach, which allows for an objective and scientific examination of the relationships between variables. This paradigm supports the formulation and testing of hypotheses, making it suitable for the study's aim of exploring the effects of supply chain visibility, collaboration, and learning on customer-oriented performance. The study employs an explanatory research design to assess

these relationships, focusing on predicting the interaction between the key variables. The quantitative approach uses numerical data from a structured questionnaire to test the hypotheses. This approach is aligned with the chosen paradigm, ensuring that the results can be generalized to the larger population. A census sampling technique is used, which involves including all 152 registered firms in the region, as this population size is manageable for a census approach.

The study used a cross-sectional approach to data gathering, collecting data simultaneously to provide a snapshot of the phenomenon under study. This method efficiently identifies patterns, relationships, and correlations among variables, making it a critical tool for explanatory social science and business research. A structured questionnaire was also used as the primary data collection instrument. Pretesting was conducted to ensure the questionnaire's appropriateness and comprehensiveness. SPSS version 26 and SmartPLS-SEM 4 were used for data processing and analysis. Data was coded in SPSS and imported to SmartPLS-SEM for further study. The tools were chosen for suitability in testing hypotheses, analysing complex models, and providing robust significance testing through bootstrapping.

The findings demonstrate that supply chain visibility significantly positively impacts customer-oriented performance. Moreover, the analysis reveals that supply chain visibility also enhances collaboration among supply chain partners, facilitating better communication and resource sharing. Also, the results confirm that collaboration strengthens the positive effects of visibility on performance, acting as a bridge that helps firms translate visibility into improved customer outcomes. This suggests that firms with strong collaboration frameworks are better positioned to leverage their supply chain visibility for superior performance, especially in meeting customer demands. The findings also show that firms with greater collaborative efforts benefit

from smoother operations, enhanced trust among partners, and better overall supply chain coordination, ultimately leading to increased customer satisfaction.

In addition to the mediation analysis, the study examines the moderating role of supply chain learning. The findings indicate that learning positively moderates the relationship between supply chain visibility and customer-oriented performance, meaning that firms that engage in continuous learning and knowledge sharing can better capitalize on their supply chain visibility. Supply chain learning allows firms to adapt more quickly to changing market conditions and customer needs, making them more agile and responsive. The results highlight that firms with strong learning cultures are likelier to apply the insights gained from visibility into actionable strategies that improve customer satisfaction, product quality, and delivery performance.

5.2 Conclusion

The study comprehensively examined the effect of supply chain visibility on customer-oriented performance, the roles of supply chain learning and collaboration with the manufacturing firms in the Greater Accra Region. The study's findings highlight the significant positive impact of supply chain visibility on customer-oriented performance. The analysis revealed that firms with improved transparency and real-time access to information within their supply chains are better positioned to meet customer needs efficiently. Supply chain visibility was found to enhance decision-making and operational efficiency and ultimately improve customer service. The study also confirmed that visibility fosters supply chain collaboration, where better access to data facilitates joint planning, resource sharing, and overall supply chain coordination, leading to stronger customer satisfaction and business outcomes.

Another key finding highlighted the mediating role of supply chain collaboration in the relationship between visibility and performance. While visibility

provides the necessary foundation through real-time data access, collaboration leverages this information to enhance performance outcomes that directly impact customer satisfaction. Collaboration was identified as a key enabler that converts the insights gained from visibility into effective strategies, such as responsive supply chain operations and customized offerings that drive customer-oriented results. Finally, the study explored the moderating role of supply chain learning, which amplifies the positive effects of visibility on performance. The result revealed that supply chain learning moderates the relationship between supply chain visibility and customer-oriented performance. This learning culture ensures that performance improvements are sustainable and aligned with evolving market demands.

5.3 Managerial Implication

Based on the research findings, several managerial implications arise for manufacturing firms seeking to enhance customer-oriented performance. First, manufacturing managers should prioritize enhancing supply chain visibility by adopting advanced technologies that enable real-time tracking and monitoring of operations. Implementing visibility tools, such as integrated software systems for inventory management, production tracking, and supplier coordination, allows manufacturers to anticipate issues and respond swiftly to customer demands. By ensuring transparency across the supply chain, firms can reduce production delays, optimize resource allocation, and improve on-time delivery, resulting in higher customer satisfaction.

Furthermore, the research highlights the critical role of strengthening supply chain collaboration to fully capitalize on the benefits of visibility. Manufacturing firms should focus on building closer, more collaborative relationships with suppliers, logistics partners, and customers. Collaboration allows for better synchronization of

production schedules, streamlined communication, and more effective problem-solving, improving product quality and delivery times. Managers should implement collaborative tools and strategies, such as shared platforms for real-time data exchange, joint forecasting, and co-development initiatives, to enhance coordination and align goals across the supply chain network.

Lastly, cultivating a culture of continuous learning is essential for manufacturing firms to maintain a competitive edge. Managers should encourage the ongoing development of skills and knowledge within their workforce and across their supply chain partners. This includes investing in training programs that promote process improvement, innovation, and adaptability. By fostering a learning environment, manufacturing firms can ensure that employees and partners remain agile and responsive to industry changes, leveraging the insights gained from visibility and collaboration to drive customer-oriented performance. Continuous learning enables firms to innovate and optimize operations, ensuring long-term growth and sustainability in the manufacturing sector.

5.4 Theoretical Implication

The theoretical implications of this study are closely aligned with the Resource-Based View (RBV), which posits that internal capabilities, such as supply chain visibility (SCV) and collaboration, are critical to achieving a sustainable competitive advantage. The study's findings demonstrate that SCV provides manufacturing firms with a valuable resource, enabling better decision-making and operational efficiency through real-time data access and transparency. However, RBV theory also emphasizes that resources like SCV alone cannot improve customer-oriented performance. The firm must effectively utilize these resources through collaborative efforts with supply chain partners. Therefore, the study underscores that supply chain collaboration acts as

a mediator, transforming SCV into enhanced customer-oriented outcomes by fostering communication, trust, and joint decision-making among supply chain members. This highlights the synergy between visibility and collaboration as strategic resources, validating RBV's assertion that resource integration and efficient utilization lead to superior performance.

Additionally, the study extends the application of Organizational Learning Theory (OLT) by introducing supply chain learning as a moderating factor in the relationship between SCV and performance. The findings suggest that the benefits of SCV are amplified when firms foster a culture of continuous learning, enabling them to interpret and apply the insights gained from visibility more effectively. OLT posits that learning is a critical process through which organizations convert information into actionable strategies. Thus, supply chain learning enhances the impact of visibility on customer-oriented performance, ensuring that improvements are sustainable and aligned with evolving market needs. This theoretical implication emphasizes integrating learning processes within supply chains to adapt swiftly to changes and leverage visibility for long-term competitive advantage.

5.5 Contribution to Knowledge

This study makes a significant contribution to knowledge by providing empirical evidence on the role of supply chain visibility in enhancing customer-oriented performance within the manufacturing sector, specifically in Ghana. While previous research has emphasized the importance of visibility in supply chains, this study uniquely highlights its direct impact on meeting customer demands through improved operational efficiency and responsiveness. The findings demonstrate that visibility alone is insufficient without effective supply chain collaboration. This introduces an understanding of how collaborative relationships between supply chain partners

amplify visibility benefits, facilitating better resource allocation, joint decision-making, and improved customer satisfaction. This contribution deepens our understanding of how these two factors interact to enhance supply chain performance in the manufacturing sector.

Furthermore, the study extends the existing literature by introducing supply chain learning as a moderating variable, demonstrating its critical role in reinforcing the relationship between visibility and performance. The research provides valuable insights into how continuous learning and adaptation within supply chains allow firms to leverage the real-time information gained from visibility more effectively. This finding contributes to the Organizational Learning Theory (OLT) by offering evidence that organizational learning processes improve innovation and adaptability and serve as essential mechanisms for turning visibility into actionable strategies that improve customer outcomes. Thus, the study enriches the theoretical landscape by integrating learning into supply chain management, particularly in the manufacturing industry, where dynamic market conditions require agility and continuous improvement.

5.6 Recommendations for Future Research

Based on the research limitations, several recommendations for future research can be made to build on the findings and address gaps identified in this study. First, future studies could expand the geographical scope beyond the Greater Accra Region to include other regions in Ghana or other countries. This would allow for a broader understanding of the effects of supply chain visibility, collaboration, and learning across diverse manufacturing sectors. Future research could uncover variations in how supply chain practices influence customer-oriented performance by examining different regions or industries, providing more generalizable findings.

Additionally, while this study used a quantitative approach, future research could adopt a mixed-methods approach, combining quantitative analysis with qualitative insights. Qualitative methods such as interviews or focus groups could provide deeper insights into manufacturing firms' specific challenges and opportunities in enhancing supply chain visibility and collaboration. This would enable researchers to capture these relationships' contextual and practical dimensions, providing a richer understanding of how supply chain strategies are implemented and their impact on performance. Furthermore, future research could explore other potential moderators or mediators in the relationship between supply chain visibility and customer performance, such as technological capabilities or market dynamics.



REFERENCES

- Agrawal, N., Smith, S. A., & Tsay, A. A. (2022). Supply chain visibility and responsiveness: An integrative strategy for competitive success. *Journal of Business Logistics*, 43(1), 52-71.
- Akhar, R. (2016). Research design as a blueprint for research studies. *Journal of Scientific Research*, 15(3), 234-241.
- Alfalla-Luque, R., Medina-López, C., & Dey, P. K. (2015). Supply chain integration framework using literature review. *Production Planning & Control*, 26(14-15), 1145-1166.
- Alharahsheh, H. H., & Pius, A. (2020). A review of key paradigms: Positivism vs interpretivism. *Global Academic Journal of Humanities and Social Sciences*, 2(3), 39-43.
- Aliyu, A. A., Bello, M. U., Kasim, R., & Martin, D. (2015). Positivist and non-positivist paradigm in social science research: Conflicting or complementary? *GSTF Journal of General Philosophy*, 2(1), 22-27.
- Ambroise, L., Lambert, S., & Niedergang, M. (2017). Customer-oriented strategies and profitability in manufacturing firms. *Journal of Manufacturing Technology Management*, 28(2), 237-259.
- Annosi, M. C., Brunetta, F., Monti, A., & Nati, L. (2021). Managing knowledge transfer in complex innovation systems: A network analysis approach. *Journal of Business Research*, 128, 576-587.
- Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Addison-Wesley.
- Arshinder, K., Kanda, A., & Deshmukh, S. G. (2011). Supply chain coordination: Perspectives, empirical studies and research directions. *International Journal of Production Economics*, 133(1), 22-38.
- Asamoah, D., Agyapong, A., & Amankwa, E. (2020). Customer-oriented supply chain management in manufacturing contexts. *Industrial Management & Data Systems*, 120(3), 457-474.
- Asamoah, D., Asare-Bediako, A., & Jacqueline, K. (2023). Influence of supply chain visibility on performance within the Ghana Health Service. *Journal of Health Logistics*, 2(1), 20-35.
- Baah, K., Acquah, I. S. K., & Ofori, D. (2020). Information sharing, supply chain visibility, and firm performance: An integrative perspective. *Journal of Supply Chain Management*, 56(3), 89-104.
- Baah, K., Acquah, I. S. K., & Ofori, D. (2021). Collaboration, supply chain visibility, and performance: An integrative view. *Supply Chain Management*, 26(4), 470-485.

- Baah, K., Boamah, R., & Antwi, S. H. (2020). Enhancing supply chain visibility for improved performance: Evidence from the Ghanaian manufacturing sector. *Journal of Manufacturing Systems*, 54, 145-158.
- Babbie, E. (2016). *The practice of social research* (14th ed.). Cengage Learning.
- Bambale, A. J. (2014). Sampling techniques in research methodology and their implications for management studies. *International Journal of Management Research and Review*, 4(2), 159-170.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Barrat, M., & Oke, A. (2007). Antecedents of supply chain visibility in retail supply chains: A resource-based theory perspective. *Journal of Operations Management*, 25(6), 1217-1233.
- Bechtsis, D., Tsolakis, N., & Vlachos, D. (2021). Supply chain visibility: A review and bibliometric analysis. *Computers & Industrial Engineering*, 152, 107086.
- Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, 2, 8-14.
- Benton, T., & Craib, I. (2010). *Philosophy of social science: The philosophical foundations of social thought*. Palgrave Macmillan.
- Bessant, J., Kaplinsky, R., & Lamming, R. (2003). Putting supply chain learning into practice. *International Journal of Operations & Production Management*, 23(2), 167-184.
- Bhattacharjee, A. (2012). *Social science research: Principles, methods, and practices* (2nd ed.). Global Text Project.
- Billah, M., Chowdhury, H., & Hasan, R. (2023). IoT, supply chain collaboration, and performance: Insights from RMG companies in Bangladesh. *International Journal of Production Economics*, 240, 108078.
- Blome, C., Schoenherr, T., & Eckstein, D. (2013). The impact of knowledge transfer and complexity on supply chain flexibility: A knowledge-based view. *International Journal of Production Economics*, 142(2), 242-250.
- Brusset, X. (2016). Does supply chain visibility enhance agility? *International Journal of Production Economics*, 171, 46-59.
- Bryman, A., & Bell, E. (2022). *Business research methods* (5th ed.). Oxford University Press.
- Bujang, M. A., Sa'at, N., Sidik, T. M. I. T., & Joo, L. C. (2018). Sample size guidelines for logistic regression from observational studies with large population: Emphasis on the accuracy between statistics and parameters based on real life clinical data. *Malaysian Journal of Medical Sciences*, 25(4), 122-130.

- Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*, 29(3), 163-180.
- Caputo, A. C., Cucchiella, F., Fratocchi, L., Pelagagge, P. M., & Scacchia, F. (2019). A review of research on the interface between operations management and green supply chains. *The International Journal of Advanced Manufacturing Technology*, 104(5-8), 1793-1816.
- Caridi, M., Crippa, L., Perego, A., Sianesi, A., & Tumino, A. (2014). Improving supply chain visibility through business intelligence tools. *Production Planning & Control*, 25(5), 400-418.
- Caridi, M., Moretto, A., Perego, A., & Tumino, A. (2010). The benefits of supply chain visibility: A value assessment model. *International Journal of Production Economics*, 151, 1-19.
- Chauhan, G., Singh, T., & Singh, A. (2022). Supply chain collaboration for competitive advantage: A systematic literature review and framework development. *Journal of Business & Industrial Marketing*, 37(3), 475-491.
- Cheah, J.-H., Sarstedt, M., Ringle, C. M., Ramayah, T., & Ting, H. (2023). Collinearity diagnostics of partial least squares structural equation modeling: Non-centered and centered variance inflation factors. *European Management Journal*, 41(1), 121-133.
- Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. *International Journal of Production Economics*, 194, 73-87.
- Chen, Y., Tang, O., Cooke, F. L., & Jin, J. (2017). How does the social context fuel the proactive fire? A multilevel review and theoretical synthesis. *Journal of Organizational Behavior*, 38(8), 1157-1177.
- Choi, T. Y., & Sethi, S. (2010). Managing the flow of information in global supply chains. *Management Science*, 56(12), 2171-2188.
- Cook, T. D., & Reichardt, C. S. (1979). *Qualitative and quantitative methods in evaluation research*. Sage Publications.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- Crossan, M. M., Maurer, C. C., & White, R. E. (2011). Reflections on the 2009 AMR decade award: Do we have a theory of organizational learning? *Academy of Management Review*, 36(3), 446-460.

- Danese, P., & Romano, P. (2011). Supply chain integration and efficiency performance: A study on the interactions between customer integration and supplier integration. *Supply Chain Management: An International Journal*, 16(4), 220-230.
- Dubey, R., Gunasekaran, A., & Roubaud, D. (2020). Upstream supply chain visibility and complexity effect on focal firm's sustainable performance: An empirical investigation. *Journal of Cleaner Production*, 244, 118605. <https://doi.org/10.1016/j.jclepro.2019.118605>
- Esper, T. L., Fugate, B. S., & Davis-Sramek, B. (2007). Logistics learning capability: Sustaining the competitive advantage gained through logistics leverage. *Journal of Business Logistics*, 28(2), 57-81. <https://doi.org/10.1002/j.2158-1592.2007.tb00059.x>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Evans, J. R., & Lindsay, W. M. (2005). *The management and control of quality* (6th ed.). South-Western College Pub.
- Evered, R., & Louis, M. R. (1991). Alternative perspectives in the organizational sciences: "Inquiry from the inside" and "inquiry from the outside." *Academy of Management Review*, 16(3), 385-395. <https://doi.org/10.5465/amr.1991.4278956>
- Fang, E. (Er), Palmatier, R. W., & Steenkamp, J. B. E. M. (2008). Effect of service transition strategies on firm value. *Journal of Marketing*, 72(5), 1-14. <https://doi.org/10.1509/jmkg.72.5.1>
- Fatorachian, H., & Kazemi, H. (2018). A critical investigation of Industry 4.0 in manufacturing: Theoretical operationalisation framework. *Production Planning & Control*, 29(8), 633-644. <https://doi.org/10.1080/09537287.2018.1424960>
- Fawcett, S. E., Magnan, G. M., & McCarter, M. W. (2007). Benefits, barriers, and bridges to effective supply chain management. *Supply Chain Management: An International Journal*, 12(1), 35-48. <https://doi.org/10.1108/13598540710724392>
- Flint, D. J., Larsson, E., Gammelgaard, B., & Mentzer, J. T. (2008). Logistics innovation: A customer value-oriented social process. *Journal of Business Logistics*, 29(1), 113-147. <https://doi.org/10.1002/j.2158-1592.2008.tb00073.x>
- Francisco, K., & Swanson, D. (2018). The supply chain has no clothes: Technology adoption of blockchain for supply chain transparency. *Logistics*, 2(1), 2. <https://doi.org/10.3390/logistics2010002>
- Ghana Statistical Service (GSS). (2021). *Economic statistics report*. Accra, Ghana: Author.

- Gibson, B. J., Flint, D. J., & Barrett, H. J. (2016). Building supply chain capabilities: A study of the impact of training on performance. *Journal of Supply Chain Management*, 52(2), 47-64. <https://doi.org/10.1111/jscm.12119>
- Gu, Q., & Huo, B. (2020). The impact of supply chain learning on innovation performance: A culture and capability perspective. *Supply Chain Management: An International Journal*, 25(2), 205-219. <https://doi.org/10.1108/SCM-09-2018-0332>
- Guo, B., Yen, D. A., & Tung, W.-F. (2020). Green entrepreneurial orientation for enhancing firm performance: A dynamic capability perspective. *Journal of Business Ethics*, 163(3), 469-485. <https://doi.org/10.1007/s10551-018-4056-3>
- Habtoor, N., Ali, H., & Sabah, S. (2020). Organizational learning capability and its impact on firm innovativeness. *Journal of Business Research*, 115, 305-314. <https://doi.org/10.1016/j.jbusres.2020.01.041>
- Hair, J. F., & Sarstedt, M. (2019). *Advanced issues in partial least squares structural equation modeling (PLS-SEM)*. Sage Publications.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2017). *Multivariate data analysis* (8th ed.). Cengage Learning.
- Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage Publications.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2018). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106-121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106-121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2022). *Advanced issues in partial least squares structural equation modeling (PLS-SEM)*. Sage Publications.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2015). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, 20, 277-319. [https://doi.org/10.1108/S1474-7979\(2012\)0000020014](https://doi.org/10.1108/S1474-7979(2012)0000020014)
- Hernandez-Espallardo, M., Rodriguez-Orejuela, A., & Sánchez-Pérez, M. (2010). Inter-organizational governance, learning and performance in supply chains. *Supply Chain Management: An International Journal*, 15(2), 101-114. <https://doi.org/10.1108/13598541011028714>

- Holcomb, M. C., Matthews, L. J., & Rogers, D. S. (2011). Cracking the complexity code: Visualize, simplify, execute. *Supply Chain Management Review*, 15(3), 28-34.
- Huber, G. P. (1991). Organizational learning: The contributing processes and the literatures. *Organization Science*, 2(1), 88-115. <https://doi.org/10.1287/orsc.2.1.88>
- Hult, G. T. M., Ketchen, D. J., & Slater, S. F. (2004). Information processing, knowledge development, and strategic supply chain performance. *Academy of Management Journal*, 47(2), 241-253. <https://doi.org/10.5465/20159573>
- Huo, B. (2012). The impact of supply chain integration on company performance: An organizational capability perspective. *Supply Chain Management: An International Journal*, 17(6), 596-610. <https://doi.org/10.1108/13598541211269210>
- Huo, B., Zhang, C., & Zhao, X. (2019). The effect of IT and relationship commitment on supply chain coordination: A contingency and configuration approach. *Information & Management*, 56(6), 103125. <https://doi.org/10.1016/j.im.2018.12.001>
- Huo, B., Zhang, C., & Zhao, X. (2019). The effect of IT and relationship commitment on supply chain coordination: A contingency and configuration approach. *Information & Management*, 56(6), 103125. <https://doi.org/10.1016/j.im.2018.12.003>
- Ikome, L. N., Lee, K. T., & Cheng, T. C. E. (2022). Manufacturing productivity: Trends and future outlook. *Production and Operations Management*, 31(5), 1632-1650. <https://doi.org/10.1111/poms.13406>
- Jeble, S., Dubey, R., Childe, S. J., Papadopoulos, T., Roubaud, D., & Prakash, A. (2018). Impact of big data on supply chain management. *International Journal of Production Research*, 56(10), 3665-3687. <https://doi.org/10.1080/00207543.2018.1429252>
- Jimenez-Jimenez, D., Sanz-Valle, R., & Hernandez-Espallardo, M. (2018). Fostering innovation through knowledge sharing: Insights from Spanish companies. *Journal of Knowledge Management*, 22(2), 438-455. <https://doi.org/10.1108/JKM-03-2017-0125>
- Khatri, N. (2020). Understanding the influence of research paradigms on research methodologies and methods. *The Open University of Tanzania Journal of Management Science*, 5(1), 1-13.
- Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education*, 6(5), 26-41. <https://doi.org/10.5430/ijhe.v6n5p26>
- Knock, L. (2015). The effects of multicollinearity and measurement error on partial least squares path modeling. *Quality & Quantity*, 49(3), 1163-1178. <https://doi.org/10.1007/s11135-014-9998-0>

- Kraft, T., Valdés, L., & Zheng, Y. (2020). Visibility and risk management in supply chain networks. *Management Science*, 66(10), 4579-4596. <https://doi.org/10.1287/mnsc.2019.3527>
- Kuhn, T. S. (1970). *The structure of scientific revolutions* (2nd ed.). University of Chicago Press.
- Kumar, V., & Gupta, S. (2016). Conceptualizing service-oriented strategy in manufacturing firms. *Industrial Marketing Management*, 53, 173-194. <https://doi.org/10.1016/j.indmarman.2015.11.008>
- Lee, H. L., & Rammohan, S. V. (2017). Building supply chain excellence in emerging economies. In *International Series in Operations Research & Management Science* (Vol. 98, pp. 213-232). Springer. https://doi.org/10.1007/978-3-319-51467-4_13
- Lei, D., Slocum, A. W., & Pitts, R. A. (2019). Building cooperative advantage: Managing strategic alliances to promote organizational learning. *Journal of World Business*, 54(4), 325-340. <https://doi.org/10.1016/j.jwb.2018.10.001>
- Leuschner, R., Rogers, D. S., & Charvet, F. F. (2013). A meta-analysis of supply chain integration and firm performance. *Journal of Supply Chain Management*, 49(2), 34-57. <https://doi.org/10.1111/jscm.12004>
- Liao, C., Hong, P., & Rao, S. S. (2017). Supply chain integration and firm financial performance: A meta-analysis of positional advantage mediation and moderating factors. *European Management Journal*, 35(3), 282-295. <https://doi.org/10.1016/j.emj.2016.11.001>
- Lins, K. V., Servaes, H., & Tamayo, A. (2021). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *Journal of Finance*, 76(5), 1781-1824. <https://doi.org/10.1111/jofi.12959>
- Lubis, A. N., Nasution, H. N., Sembiring, A. R., & Muda, I. (2020). The effect of supply chain management practices on corporate performance: Customer satisfaction and loyalty. *Journal of Distribution Science*, 18(5), 19-31. <https://doi.org/10.15722/jds.18.5.202005.19>
- Maghsoudi, A., & Pazirandeh, A. (2016). Visibility, resource sharing and performance in supply chain relationships: Insights from humanitarian practitioners. *Supply Chain Management*, 21(1), 125-139. <https://doi.org/10.1108/SCM-01-2015-0003>
- Malhotra, N. K., & Birks, D. F. (2007). *Marketing research: An applied approach* (3rd ed.). Prentice Hall.
- Manthou, V., Vlachopoulou, M., & Folinas, D. (2004). Virtual e-Chain (VeC) model for supply chain collaboration. *International Journal of Production Economics*, 87(3), 241-250. <https://doi.org/10.1016/j.ijpe.2003.10.001>
- Marchet, G., Melacini, M., Perotti, S., & Tappia, E. (2012). Exploring the impact of inventory leanness and flexibility on service levels: A simulation study.

Production Planning & Control, 23(8), 625-639.
<https://doi.org/10.1080/09537287.2011.588772>

- Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* (3rd ed.). Sage Publications.
- McCrea, B. (2005). Supply chain visibility: Lost in translation. *Logistics Management*, 44(6), 7-11.
- Mertens, D. M. (2010). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). Sage Publications.
- Mishra, D., Gunasekaran, A., Papadopoulos, T., & Childe, S. J. (2018). Big data and supply chain management: A review and bibliometric analysis. *Annals of Operations Research*, 270(1-2), 313-336. <https://doi.org/10.1007/s10479-018-2846-3>
- Mor, R. S., Gupta, S., & Choudhury, V. (2018). Role of supply chain integration in determining organizational performance. *Journal of Advances in Management Research*, 15(3), 266-287. <https://doi.org/10.1108/JAMR-09-2017-0085>
- Mubarik, M. S., Chandran, V. G. R., Devadason, E. S., & Kaliappan, S. R. (2021). Stimulating innovation through the lens of culture: A multidimensional framework. *Technological Forecasting and Social Change*, 162, 120398. <https://doi.org/10.1016/j.techfore.2020.120398>
- Nagati, H., & Rebolledo, C. (2013). Supplier development efforts: The suppliers' point of view. *Industrial Marketing Management*, 42(2), 180-188. <https://doi.org/10.1016/j.indmarman.2012.11.007>
- Nimmy, S., Kumar, G., & Agrawal, R. (2019). Integrating big data analytics into supply chain management: A review and insights. *Production Planning & Control*, 30(15), 1245-1263. <https://doi.org/10.1080/09537287.2019.1587339>
- Nuttavuthisit, K., & Thøgersen, J. (2017). The importance of consumer trust for the emergence of a market for green products: The case of organic food. *Journal of Business Ethics*, 140(2), 323-337. <https://doi.org/10.1007/s10551-015-2652-3>
- Owusu-Frimpong, N., & Boateng, H. (2017). Demand forecasting and inventory management practices in the retail sector: A case study. *International Journal of Retail & Distribution Management*, 45(4), 419-434. <https://doi.org/10.1108/IJRDM-10-2016-0237>
- Panahifar, F., Byrne, P. J., Salam, M. A., & Heavey, C. (2018). The impact of supply chain collaboration on performance: A configurational approach. *Industrial Management & Data Systems*, 118(5), 1049-1070. <https://doi.org/10.1108/IMDS-10-2017-0403>
- Pandey, P., & Pandey, M. M. (2021). *Research methodology: Tools and techniques*. Bridge Center.

- Patel, P. C., Guedes, M. J., & Pearce II, J. A. (2013). The role of service operations management in new retailing venture survival. *Journal of Retailing*, 89(3), 241-251. <https://doi.org/10.1016/j.jretai.2013.02.003>
- Potwarka, L. R., Kaczynski, A. T., & Flack, A. L. (2019). Places to play: Association of park space and facilities with healthy weight status among children. *Journal of Community Health*, 34(5), 907-915. <https://doi.org/10.1007/s10900-019-00635-y>
- Ralston, P. M., Blackhurst, J., Cantor, D. E., & Crum, M. R. (2017). A structure-conduct-performance perspective of how strategic supply chain integration affects firm performance. *Journal of Supply Chain Management*, 53(2), 12-28. <https://doi.org/10.1111/jscm.12117>
- Ramanathan, U., & Gunasekaran, A. (2014). Supply chain collaboration: Impact of success in long-term partnerships. *International Journal of Production Economics*, 147, 252-259. <https://doi.org/10.1016/j.ijpe.2013.02.011>
- Rebolledo, C., & Nollet, J. (2011). Learning from suppliers in the aerospace industry. *International Journal of Production Economics*, 129(2), 328-337. <https://doi.org/10.1016/j.ijpe.2010.10.015>
- Rehman, S. U., & Alharthi, K. (2016). An introduction to research paradigms. *International Journal of Educational Investigations*, 3(8), 51-59.
- Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (Eds.). (2013). *Qualitative research practice: A guide for social science students and researchers*. Sage.
- Rodger, J. A., & Parry, G. (2020). Assessing the impact of supply chain collaboration on performance: A literature review. *Production Planning & Control*, 31(7), 589-604. <https://doi.org/10.1080/09537287.2020.1710742>
- Routroy, S., & Pradhan, S. K. (2018). Analyzing the barriers of green supply chain management practices: A hierarchical analytical process. *Benchmarking: An International Journal*, 25(2), 560-587. <https://doi.org/10.1108/BIJ-09-2016-0138>
- Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, 27(2), 237-263. <https://doi.org/10.2307/30036528>
- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research methods for business students* (4th ed.). Prentice Hall.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education Limited.
- Sayani, H. (2015). Customer loyalty in financial services from a service-dominant logic perspective. *Journal of Marketing Management*, 31(13-14), 1404-1435. <https://doi.org/10.1080/0267257X.2015.1073444>
- Sciarra, D. (1999). *The role of the qualitative researcher*. Malabar, FL: Krieger.

- Scuotto, V., Del Giudice, M., & Carayannis, E. G. (2017). The effect of social networking sites and absorptive capacity on SMEs' innovation performance. *Journal of Technology Transfer*, 42(2), 409-424. <https://doi.org/10.1007/s10901-016-9494-5>
- Shen, B., Ding, X., & Chen, L. (2019). Product lifecycle management in the era of Industry 4.0: Challenges and opportunities. *International Journal of Production Research*, 57(12), 3927-3942. <https://doi.org/10.1080/00207543.2018.1443245>
- Shiau, W.-L., Dwivedi, Y. K., & Lai, H.-H. (2019). Examining the core knowledge on Facebook. *International Journal of Information Management*, 48, 194-203. <https://doi.org/10.1016/j.ijinfomgt.2019.02.001>
- Silvestre, B. S., Silva, L. H., & Ferenhof, H. A. (2020). Supply chain sustainability: A tertiary literature review. *Journal of Cleaner Production*, 242, 118324. <https://doi.org/10.1016/j.jclepro.2019.118324>
- Singagerda, F., Fauzan, A., & Desfiandi, A. (2021). Impact of supply chain visibility on business performance in Indonesian logistics firms. *Journal of Business Logistics*, 42(2), 163-179. <https://doi.org/10.1111/jbl.12304>
- Singer, E., & Couper, M. P. (2017). Ethical considerations in web surveys. In R. M. Groves, D. A. Dillman, J. L. Eltinge, & R. J. A. Little (Eds.), *Survey methodology* (pp. 445-464). Wiley.
- Singh, R. K., Garg, S. K., & Deshmukh, S. G. (2019). The competitiveness of SMEs in a globalized economy: Observations from China and India. *Management Decision*, 47(1), 7-30. <https://doi.org/10.1108/00251740810846956>
- Sodhi, M. S., & Tang, C. S. (2019). Research opportunities in supply chain transparency. *Production and Operations Management*, 28(12), 2946-2959. <https://doi.org/10.1111/poms.13005>
- Somapa, S., Cools, M., & Dullaert, W. (2018). A strategic framework for sustainable supply chain management. *International Journal of Production Economics*, 195, 332-348. <https://doi.org/10.1016/j.ijpe.2017.11.013>
- Stockemer, D., Koehler, S., & Lentz, T. (2019). Data collection in the digital age: Innovative alternatives to student samples. *MIS Quarterly*, 43(2), 665-667. <https://doi.org/10.25300/MISQ/2019/43.2.05>
- Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social and behavioral research*. Thousand Oaks, CA: Sage.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533. <https://doi.org/10.1002/smj.425>
- Tricando-Munoz, F., Quintero, A., & Lopes, J. (2020). Customer-centric supply chain strategies: A systematic literature review. *International Journal of Production Research*, 58(11), 3367-3381. <https://doi.org/10.1080/00207543.2020.1745172>

- Tyrer, P., & Heyman, B. (2016). Sampling in epidemiological research: Issues, hazards and pitfalls. *BJPsych Bulletin*, 40(2), 57-60. <https://doi.org/10.1192/pb.bp.115.050425>
- Uddin, S. (2022). Understanding the effects of supply chain collaboration on performance. *International Journal of Logistics Management*, 33(2), 571-590. <https://doi.org/10.1108/IJLM-05-2020-0192>
- Um, S., & Kim, S. (2019). The impact of supply chain collaboration on firm performance in the high-tech industry. *International Journal of Production Economics*, 211, 42-53. <https://doi.org/10.1016/j.ijpe.2019.01.014>
- Um, S., & Kim, S. (2019). The impact of supply chain collaboration on firm performance in the high-tech industry. *International Journal of Production Economics*, 211, 42-53. <https://doi.org/10.1016/j.ijpe.2019.01.014>
- Valenzuela-Fernández, L., & Villegas, L. M. (2016). Customer-focused strategies and capabilities in manufacturing firms: An empirical investigation. *International Journal of Production Economics*, 171, 619-633. <https://doi.org/10.1016/j.ijpe.2015.06.012>
- Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant validity testing in marketing: An analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science*, 44(1), 119-134. <https://doi.org/10.1007/s11747-015-0455-4>
- Wang, Y. (2018). Integrating supply chain learning and supply chain practices for enhanced performance. *International Journal of Production Research*, 56(1-2), 233-249. <https://doi.org/10.1080/00207543.2017.1382278>
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171-180. <https://doi.org/10.1002/smj.4250050207>
- Wieland, A., Handfield, R. B., & Durach, C. F. (2015). Mapping the landscape of future research themes in supply chain management. *Journal of Business Logistics*, 36(3), 1-11. <https://doi.org/10.1111/jbl.12098>
- World Bank. (2020). *Manufacturing and economic development*. World Development Indicators. <https://databankfiles.worldbank.org/public/ddpext/?f=1&v=1&d=110&l=en>
- Yazdani, N., Van Hoek, R., & Henke, M. (2021). Exploratory and explanatory research in supply chain management. *Journal of Supply Chain Management*, 57(1), 35-48. <https://doi.org/10.1111/jscm.12188>
- Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education*, 48(2), 311-325. <https://doi.org/10.1111/1465-3435.12043>

- Yu, Z., Yan, H., & Cheng, T. C. E. (2001). Benefits of information sharing with supply chain partnerships. *Industrial Management & Data Systems*, 101(3), 114-119. <https://doi.org/10.1108/02635570110387129>
- Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods* (9th ed.). Cengage Learning.



APPENDIX

QUESTIONNAIRE

I am Samuel Danso-Amoako, a postgraduate student at the University of Education, Winneba, Department of Procurement and Supply Chain Management. This survey instrument has been designed to enable me to carry out research on the topic: **“EFFECT OF SUPPLY CHAIN VISIBILITY ON CUSTOMER-ORIENTED PERFORMANCE AND THE ROLES OF SUPPLY CHAIN COLLABORATION AND LEARNING”**. The data is solely needed for academic purposes, and its confidentiality is assured. Participation is entirely voluntary. Please tick [] the most appropriate answer to each of the questions.

Section A: Demographic Information

1. Gender: [] Male [] Female
2. Age: [] 23 years and below [] 24–29 years [] 30–35 years
 [] 36–40 years [] 41 years and above
3. Educational Background:
 [] Secondary [] 1st Degree [] Master’s Degree [] Ph.D./Doctorate
4. Number of years the firm has been in operation:
 [] Less than 1 year [] 1-5 years [] 6-10 years
 [] 11-15 years [] 16-20 years [] 21 years & above

Section B: Supply Chain Visibility

Please indicate by ticking [] the appropriate column using the scale: 1= Slightly agree – 7= Strongly agree

	Statements	1	2	3	4	5	6	7
SCV1	We are able to communicate with supply chain partners regarding fluctuations in demand and alterations in customer preferences.							
SCV2	We share performance feedback with our supply chain partners.							

SCV3	Our company involves stakeholders in making decisions about customer preferences and new product requirements.							
SCV4	We consistently monitor inventory levels across the supply chain.							
SCV5	We gather information from various sources to gauge the market and prepare for seasonal fluctuations.							
	Source: (Baah et al.,2020; Dubey et al., 2018; Mubarik et al., 2021)							

Section C: Supply Chain Collaboration

Please indicate by ticking [] the appropriate column using the scale: 1= Slightly agree – 7= Strongly agree

	Statements	1	2	3	4	5	6	7
SCC1	We engage in collaborative decision-making with our partners							
SCC2	Our firm and supply chain partners jointly strategize to meet supply chain objectives.							
SCC3	Our firm and supply chain partners cooperatively manage costs, risks, and rewards.							
SCC4	We address customer feedback and resolve complaints collectively.							
SCC5	There is mutual trust among members of our supply chain.							
	Source: (Uddin, 2022; Baah et al., 2020)							

Section D: Supply Chain Learning

Please indicate by ticking [] the appropriate column using the scale: 1= Slightly agree – 7= Strongly agree

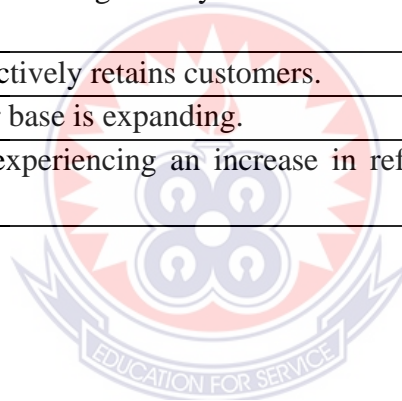
	Statements	1	2	3	4	5	6	7
SCL1	We prioritize ongoing learning among our managers to enhance customer service.							
SCL2	We encourage continuous improvement and learning among managers in our organizations to optimize operations and service							
SCL3	We ensure that insights about the market and customers are disseminated throughout our supply chain organizations.							
SCL4	Our primary supplier delivers essential and valuable information that aids in product innovation.							

SCL5	Our company conducts systematic checks to confirm that the knowledge from our key customers is utilized effectively							
SCL6	During product development, our company extensively learns from our key customers.							
SCL7	Our company receives extensive production information from our key customers.							

Section E: Customer-Oriented Performance

Please indicate by ticking [√] the appropriate column using the scale: 1= Slightly agree – 7= Strongly agree

	Statements	1	2	3	4	5	6	7
COP1	We successfully meet our customers' needs.							
COP2	We ensure timely delivery.							
COP3	We respond swiftly to customer requirements.							
COP4	We maintain high service standards for customers.							
COP5	Our customers are generally satisfied with our services.							
COP6	Our firm effectively retains customers.							
COP7	Our customer base is expanding.							
COP8	Our firm is experiencing an increase in referred customers.							



THANK YOU