

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

SCHOOL OF BUSINESS

TOPIC:

**EXAMINING THE RELATIONSHIP BETWEEN SUPPLY CHAIN COLLABORATION
AND SUPPLY CHAIN INNOVATION: THE MODERATING ROLE OF
INFORMATION SHARING**

BY

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DECLARATION

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

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ABSTRACT

The main objective of the research is to examine the relationship between supply chain collaboration and supply chain innovation as well as the moderating role of information sharing on the relationship. Specifically, the study sought to: examine the relationship between supply chain collaboration and supply chain innovation in manufacturing firms, examine the moderating role of information sharing on the relationship between supply chain collaboration and supply chain innovation in some selected manufacturing firms. Survey data, descriptive research design and quantitative approach were used. Simple random sampling techniques were used to gather data from the relevant respondents. SPSS and Hayes Process Model were used to analyze the data. The findings revealed that interdependent of supply chain knowledge, supply chain collaboration and supply chain partnership insight have positive and significant link with supply chain innovation. The findings also revealed that supply chain partnership insight has a positive and significant link with supply chain innovation. However, there is no positive and significant link between interdependent of knowledge and supply chain collaboration level. It was further revealed in the study that information sharing does not moderates the relationship between supply chain collaboration (interdependent of knowledge, supply chain collaboration level and supply chain partnership insight) and supply chain innovation. Future studies can consider a comparative study to determine which industry has collaboration in supply chain innovation so that they can be used as benchmark for others to emulate.

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LIST OF ABBREVIATIONS

GDP.....	Gross Domestic Products
SCM.....	Supply Chain Management
SSC.....	Sustainable Supply Chain
L&SCM.....	Logistics and Supply Chain Management
SCMNCI.....	Supply chain management collaborative innovation
SSCP.....	Sustainable Supply Chain Performance
SCC.....	Supply Chain Collaboration
UK.....	United Kingdom
SME.....	Small and Medium Enterprises
SCMKCI.....	Supply Chain Market Collaborative Innovation
SCTCI.....	Supply Chain Technology Collaborative Innovation

SET.....	Social Exchange Theory
NGOs.....	Non- Governmental Organizations
SCA.....	Sustained Competitive Advantage
RBV.....	Resource Based View
SCI.....	Supply Chain Integration
Vmi.....	Vendor Managed Inventory
CPFR.....	Collaborative Planning Forecasting and Replenishment
R&D.....	Research and Design
CNT.....	Collaborative Network Theory

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KNUST

DEDICATION

I dedicate this work to the almighty God for His Mercies and favors He has granted onto me throughout my entire study of the program.



CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Ghana's economy has experienced rapid GDP growth in recent years, with an average annual growth rate of 5.78% between 1995 and 2018. According to Anaman and Osei-Amponsah (2007) and Hou et al. (2021), the proportion of industrial output in Ghana's GDP has increased to 33.97%, nearly double the figure from 1992. However, evidence suggests that this expansion has come from sources other than manufacturing, which was thought to be a key driver of Ghana's economic growth (Davies and Kerr, 2018). By the end of the 1990s, manufacturing's projected GDP contribution was 9.37 percent, and it remained unchanged until the 2008 financial crisis (Hou et al., 2021; Huq et al., 2018). Countries throughout the world measure their economic strength based on the overall number of products or services they contribute to the world. According to data gathered by the United Nations, China is the world's manufacturing powerhouse (Mckay and Song, 2010). Numerous reports have also demonstrated the impact of manufacturing on infrastructure development, job creation, and GDP contribution, as well as how a well-functioning manufacturing sector functions as a link to economic prosperity. Manufacturing is critical to human survival since it provides the majority of the numerous items and services that humans rely on to survive (Abdel et al., 2020).

The main objective of Ghana's economic development program has been the growth of the manufacturing sector. The government's industrialization policy helped the nation establish a variety of manufacturing industries during the 1990s, including food processing, tobacco, textiles, garments, timber products, chemicals, and pharmaceuticals. This policy was based on the nation's comparative advantage in natural resources and low-cost labor. However, over the past two

decades, services have grown more quickly than manufacturing (Honorati and de Silva, 2016). The manufacturing sector plays a key role in the development and expansion of economies around the world. With globalization influencing consumer preferences and choices, the necessity for collaboration throughout supply chains to accommodate changing desires has become critical in order for businesses to remain competitive across industries. Manufacturing accounts for about 6% of Ghana's GDP and employs over 250,000 people. In the country, some 25,000 manufacturing companies have been registered (Quarshie et al., 2017). The mining, food and beverage production, textiles, chemicals, and pharmaceutical industries dominate Ghana's manufacturing sector, with the majority of these businesses being in the country's most densely populated industrial districts (Chen et al., 2015).

According to Scholten and Schilder (2015), Soosay and Hyland (2015), Zhang and Cao (2018), the term "supply chain collaboration" is being used more frequently as a contemporary and general word for profitable business partnerships. These connections might take the form of alliances, partnerships, supplier-manufacturer or buyer ties, integration, joint ventures, or networks. Unifying partnerships in many forms, scales, and contexts, these connections share the characteristic of companies collaborating to produce certain benefits that one cannot obtain (or achieve as much) on one's own. As supply chains become more globalized, collaboration among supply chain participants is increasingly likely to take the shape of a network, where horizontal collaborations may affect vertical collaborations (supplier-manufacturer relationships) or vice versa. Both manufacturers and suppliers must deal with new partnerships that may not have been their first choice but are essential to the success of the partners (Lockstrom et al., 2010). In the case of China, profits produced on the Chinese market have significantly aided the growth of the international automotive sector. Although not all collaborations are successful (Han et al., 2018),

managing the various relationships between suppliers and manufacturing companies has been one of the largest obstacles.

The term "demand-driven supply chains" refers to a relatively new approach to supply chain management that places a strong emphasis on the value of meeting both market and consumer demand for goods and services (Ma et al., 2018). In this sense, it stands to reason that the capacity of supply chain participants to impromptu exchange knowledge through their routinely collaborative relationships may provide a platform for a deeper comprehension of the kind of supply chain capability that innovation demands (Apostolos et al., 2017). In other words, it may be assumed that the supply chain quality improvement volume of innovation capability will increase the efficiency of the supply chain capability. In the past several decades, businesses have had to seek outside of their own walls for chances to work with partners in order to make sure that the supply chain is effective and responsive to changing consumer demands. Businesses can manage information sharing (Du et al., 2012), inventory levels (Yang et al., 2013), supply chain alignment (Ramanathan, 2013), risk management (Quoc Le et al., 2013), coordination (Wang and Du, 2010), innovation capability (Wang and Wei, 2013), create capabilities for innovation (Wang and Wei, 2013), and competitive advantage (Liao et al., 2017) with the aid of collaboration with partners.

Working together to complete tasks and realize common objectives can be characterized as collaboration. As a result, it is a circular process in which people or organizations cooperate in ways that go beyond just aligning their aims with those of others, as in cooperative endeavors, and involve a deep-seated, group drive to accomplish a common goal (Yung et al., 2009).

When competing for limited resources, cooperative businesses are especially likely to receive more funding, recognition, and awards. In the study of supply chain management (SCM), one of the terms that is frequently used is collaboration (Lee et al., 2015).

1.2 Problem Statement

Collaboration offers the company a number of advantages. Although implementing supply chain collaboration may have advantages like access to more resources and recognition, it is not an easy process (Yuen and Thai, 2017). Singh et al. (2018) list a number of obstacles to supply chain collaboration, including a lack of supply chain vision, a lack of support from senior management, and insufficient information exchange. The challenges of supply chain collaboration are confirmed, and an investigation by Deloitte and Oil and Gas UK from 2015 to 2019 found that, on average, 50% of supply chain collaboration projects fail. Numerous academics in this context argue for greater focus on how cooperative supply chain entities might promote innovation (Fawcett et al., 2014; Singhry, 2015). According to the observations, working with the company's supply chain partners could be a rich source of innovation that is much required. However, it is uncertain how to concentrate such cooperative efforts to promote innovation on a theoretical and practical level.

Once more, adopting green practices at the chain level carries risks (Mangla et al., 2015). In a study of Indian polyplastic manufacturing businesses, the operational risk category was shown to be the most important risk category for implementing green supply chain strategies (Mangla et al., 2015). Managers, especially those in emerging economies, may not be able to manage these risks since they are unaware of how to apply more sustainable practices from an operational perspective (Mangla, 2020). An operational plan links decision types to internal categories and external inputs.

An internal category that affects supply chain configuration is stakeholder collaboration. A sustainable supply chain (SSC) depends on collaborative relationships and innovations, and more research is needed in this field (Govindan et al., 2016; Chen et al., 2017). By selecting distributors and suppliers who share its strategic direction, a business must carry out its operational strategy. The literature has empirically investigated the effects of collaboration and its effects on supply chain performance (Cao and Zhang, 2011; Wu and Chiu, 2018), however studies describing the evolution of supply chain cooperation and innovation are still lacking. Furthermore, previous studies (Cao and Zhang, 2011; Wu and Chiu, 2018) concur that the effects of collaboration have been emphasized without considering the importance of information sharing. According to Zakaria et al. (2009), although these studies offer compelling justifications, they neglect the potential impact that the information and knowledge being shared can have. As a result, they advise further research to look into knowledge sharing as a moderating factor in such partnerships. This conclusion that information sharing should be investigated in more studies is supported by Mangla (2020). This study fills a research gap by concentrating on how supply chain partners may work together effectively to immediately notice changes in the outside environment (for instance, the level of competition) and fast react to market and consumer demand. Thus, the study aims to investigate the moderating effects of information sharing and the impact of supply chain collaboration on innovation in Ghanaian manufacturing enterprises.

1.3 General objectives of the Study

The main objective of the research is to examine the relationship between supply chain collaboration and supply chain innovation as well as the moderating role of information sharing on the relationship.

The following specific objectives are formulated.

1. To examine the relationship between supply chain collaboration and supply chain innovation in manufacturing firms.
2. To examine the moderating role of information sharing on the relationship between supply chain collaboration and supply chain innovation in some selected manufacturing firms.

1.4 Research Questions

1. What is the relationship between supply chain collaboration and supply chain innovation in manufacturing firms?
2. What is the moderating role of information sharing on the relationship between supply chain collaboration and supply chain innovation in some selected manufacturing firms?

1.5 Significance of the Study

The study contributed knowledge on supply chain collaboration and innovation. It also outlined the essential collaborative capabilities that organizations and their external network, must obtain to foster innovation. This helps to educate stakeholders on the need for supply chain collaboration. Furthermore, it provided a guideline for practitioners, particularly, those in Ghana taking effective supply chain collaboration manufacturing firms. Furthermore, it served as a reference for researchers in this area, particularly, those in emerging economies like Ghana on Supply chain collaboration and innovation manufacturing firms. This study recommended the necessary measures to be taken to ensure effective supply chain collaboration and innovation among manufacturing firms.

1.6 Overview of Methodology

Exploratory research design was used because the researcher sought to explore the relationship between the variables. Quantitative research approach was also used in the research.

Questionnaires were developed from adopted items from literature as the tool for data collection.

Convenience sampling technique was used to collect data from respondents. SPSS and Hayes Process Model were used to analyzed the data after validity and reliability test.

1.7 Scope of the Study

The study focused mainly on manufacturing firms in Ghana and specifically examined the effects of supply chain collaboration on supply chain innovation. The study adopted the employees of manufacturing firms, executive officers, and the owners of these manufacturing firms. The study relied on a quantitative study approach and a descriptive survey research design in examining the effects of supply chain collaboration and innovation on manufacturing firm. It employed employees of the selected manufacturing firms as sample size.

1.8 Limitations of the study

The study only used first-hand information. Instead of using a longitudinal study design, it used cross-sectional research. It is dependent on using questionnaires. It is located in Ghana and only focused on manufacturing companies which limited the generalization of the results.

1.9 Organization of the Study

There are five chapters in the study. The issue statement, research aims, research questions, significance, study scope, constraints, and delimitations are all presented in Chapter 1 of the study. The theoretical and empirical literatures are detailed in Chapter 2. The study's research technique is presented in Chapter 3. The method of data presentation, analysis, and conclusion discussion are covered in chapter four. The recommendations for future research are included in chapter five along with the findings, conclusions, and recommendations for use in policymaking.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This study seeks to examine the effect of Supply chain collaboration and innovation on manufacturing firms in the Ashanti region of Ghana. In this chapter, current literature relating to Supply chain collaboration and innovation are discussed. This reviewed is categorized into four main sections: conceptual review, theoretical review, empirical review, and conceptual framework. The theoretical review provides information on the relevant theory that unpins the research: social exchange theory and social exchange theory will be used whilst conceptual review focuses on the key concepts relevant to the subject matter. The empirical review focuses on reviews of relevant existing works whilst the conceptual framework presents a diagrammatic view of the conceptualization.

2.2 Conceptual Review

This section emphasis on the main concepts which are mainly related to the subject matter.

2.2.1 The Concept of Supply Chain Management

The coordination and administration of operations within a network of internal and external relationships is known as supply chain management and logistics. According to Mentzer et al. (2001), the supply chain is generally understood to consist of three or more businesses that are directly linked to the upstream and downstream flows of goods, services, money, and information. Individual enterprises can access resources, build capabilities, and have an impact on performance thanks to these relationships (Carter et al., 2017; Lavie, 2006). In the notion of supply chain management, managers seek partners that have the ability to read and comprehend the environment as well as share information with one another to improve performance outcomes (Gunasekaran et

al. 2008; Zhang et al., 2002). Additionally, L&SCM sees organizations as a network of institutions that collaborate across firms to exchange access to resources, skills, knowledge, and markets in order to boost the likelihood of both individual and group success (Chan et al., 2004). L&SCM thus necessitates a dynamic and ever-evolving perspective of reality based on a complete knowledge of methods for responding to market and environmental factors by using a variety of organizational processes that are both internal and external to the firms. In the existing literature, the idea that supply chain performance can be enhanced when supply chain members react to other supply chains has gained traction (Balakrishnan and Geunes, 2004).

The rationale that any one company involved in the supply chain cannot compete on its own has led to extensive research on collaboration in this setting (Rosenzweig, 2009). Raw material suppliers must comprehend the needs of downstream customers in order to modify upstream supplies to enable the production of highly demanded products and maintain the competitiveness of the entire supply chain. In a similar vein, companies in the downstream supply chain must exchange real-time transaction data with those in the upstream supply chain in order to effectively support demand-driven order fulfillment and forecasting. In order to plan and carry out supply chain operations jointly in order to achieve shared objectives and advantages, supply chain collaboration entails both process and relationship integration (Cao and Zhang, 2011).

2.2.2 Collaboration

One of the most crucial enablers in supply chain management is collaboration. Major supporting components of supply chain collaboration (SCC) were acknowledged by Barratt (2004). Collaboration between parties can increase supply-side resilience (Fan and Stevenson, 2020). For evaluating supply chain performance in terms of collaboration, there are a number of barriers and performance metrics (Prajogo and Olhager, 2012; Cai and Choi, 2020). For instance, in the context

of the garment business, supply chain collaboration and integration are essential (Anbanandam and Banwet, 2011). When evaluating the effectiveness of SME supply chains, departmental collaboration, supplier coordination, and customer coordination are crucial (Kumar and Singh, 2017). Smooth supply chain practices in SMEs enable improved business performance within a company as well as better supply chain performance in a big industry (Hong and Jeong, 2006).

Collaboration and coordination are necessary for efficient supply chain operations in SMEs (Quayle, 2003).

The brand owner is held accountable for extending sustainability down the chain because customers and stakeholders do not differentiate between the supply chain actors (Hartmann and Moeller, 2014). In general, when a purchasing firm notices weaknesses in the sustainability performance of its suppliers, it can either invest resources to improve performance or hunt for substitute suppliers (Sancha et al., 2016). Since sustainable suppliers seem to be a limited resource, businesses frequently choose the first choice. In reality, it can be challenging for the purchasing company to identify suppliers who can meet the requirements for material quality while also demonstrating a sufficient level of awareness of how to manage environmental and social issues (Touboullic and Walker, 2015).

Assessment and collaboration are two strategies that might improve suppliers' sustainability performance. The latter relies on trust, whereas the former often relies on power. By using questionnaires, non-regulatory standards, or audits, assessment (monitoring and evaluation) primarily tries to regulate suppliers' outputs in relation to certain performance criteria (Sancha et al., 2016). A partnership process, supply chain collaboration involves at least two independent parties cooperating to achieve shared objectives and benefit both sides. According to Chen et al.

(2016), collaboration can also take place horizontally between businesses and NGOs as well as vertically between suppliers and customers.

The framework that categorizes the types of collaborative partnerships is an attempt to address supply chain collaboration for sustainability from a comprehensive perspective (Chen et al., 2017). In order to collaboratively improve the sustainability performance, working with suppliers typically entails financial support, training, and educational initiatives. Because they are positively correlated, assessment and collaboration are necessary to create a sustainable value chain (Zhang et al., 2017). The factors that seem to be assisting in the construction of a collaboration are trust, commitment, complementary resources and competences, and engagement in supplier development initiatives (Touboullic, 2015). However, according to Danese et al. (2019), the purchasing firm's leadership and influence are not necessary to achieve an advanced sustainability level. Collaboration appears to be a key component in spreading sustainability in global and fragmented industries when there is a significant level of outsourcing to poor nations.

Collaboration efforts in this area, however, should still be expanded, so businesses should extend sustainability throughout the entire chain. According to prior study, manufacturing companies can use a variety of strategic approaches to sustainability, depending on how much weight they place on these issues. However, it necessitates a comprehensive approach; for example, a consumer may be engaged in implementing social and environmental standards, but unless its suppliers are also interested in sustainability, any attempt to achieve sustainability may be in vain (Lion et al., 2016). NGOs and commercial organizations can also promote collaboration by exchanging knowledge and resources. However, NGOs must contribute to the development of benefits as well as to the promotion of commitment and trust (Benstead et al., 2018; Ho et al., 2019). The lack of studies

examining how supply chain collaboration might enhance social sustainability is particularly notable in the area of social sustainability.

2.2.3 Collaboration and Innovation

Because it leads to gaining a competitive advantage, innovation is essential for a company to survive (Jajja et al., 2017; Kim et al., 2018). The literature on innovation describes a number of classification schemes for invention. Innovation is categorized as radical or incremental depending on how innovative it is (Szymanski et al., 2007). Radical innovation has a high level of novelty. The combination of information is what is isolated from contemporary methods and practices (Yunus, 2018). It can create whole new products or services that materially improve the performance of the business (Cheng and Chen, 2013; Story et al., 2014). This kind of innovation has the power to both expand and change markets. Therefore, it may be said that radical innovation is the key to economic development (Souto, 2015). Small adjustments to an established product are referred to as incremental innovation (Yunus, 2018). It doesn't necessitate a major shift in how businesses use technology. Because it succeeds, adapts, and builds on what is already there, it is also less expensive and riskier than radical innovation (Lin et al., 2013). According to Ringberg et al. (2018), incremental innovation proceeds steadily and is primarily dependent on the close coordination of rivalry-related activities. In the supply chain, radical and incremental innovation frequently refers to changes to goods, services, and procedures that can either lower costs or boost supply chain effectiveness (Roy et al., 2004).

According to research on the subject of the value of collaboration for innovation, opportunities for innovation are produced when businesses collaborate on joint planning, knowledge, information, and resource sharing, as well as on harmonizing and integrating activities (Francesco et al., 2015; Kumar et al., 2017; Zhou et al., 2017). Supply chain partners can produce shared advantages and increase SC performance by innovating when they work together to achieve long-term connections

(Bandara et al., 2017). The deployment of supply chain integration, according to Arlbjorn et al. (2011), is a factor in both radical and incremental innovation. The ability of a company to collaborate with others facilitates both radical and gradual innovation, according to Soosay et al. (2008).

However, each form of innovation requires a particular set of circumstances due to the differences between incremental and radical innovation (Arlbjorn et al., 2011; Soosay et al., 2008). For instance, radical innovation frequently calls for ground-breaking concepts that are developed through the process of information sharing among supply chain participants (Hao and Feng, 2016). Businesses can avoid being confined by their knowledge boundaries thanks to the interchange of information. It may offer chances to update knowledge and produce novel goods that are vastly different from those now available (Jansen et al., 2005). As a result, supply chain participants can promote radical rather than incremental innovation by exchanging knowledge (Jimenez-Jimenez et al., 2018). Additionally, businesses must commit time, effort, and a variety of resources in order to pursue radical innovation (Sheng and Chien, 2016). So, businesses must take their budget and level of centralization into account. Participating in a collective decision-making process enables businesses to consolidate authority and lessen the lack of resources and expertise needed to implement radical innovation (Sampson, 2007).

2.2.3 Supply Chain Collaboration

Collaboration is described in the context of innovation management as a process of knowledge creation, information exchange, and idea generation with the purpose of developing and commercializing innovative goods and services in the supply chain (Barbaroux, 2012).

Collaboration is a partnership approach that self-governing enterprises use to plan and carry out supply chain operations in order to increase performance during the execution phase (Cao and

Zhang, 2011). It is a mutually agreed-upon procedure by which businesses share their vision, accountability, rewards, risks, and resources in order to accomplish shared objectives (Soosay and Hyland, 2015). Supply chain partners need to be trustworthy for collaboration to take place (Ha et al., 2011). According to Liao et al. (2017), the process of information sharing, cooperative decision-making, and risk or benefit sharing characterize the application of SCC for innovation. Based on Hammervoll's (2011) recommendations, an analysis of the relationship between relational capital and SCC should place special emphasis on the implementation stage, during which the relationship is fully established.

Numerous studies in recent literature have emphasized the value of collaboration, and have also shown that working together with network partners has many benefits. According to studies, supplier collaboration lowers the risks associated with procurement and aids the company in achieving competitive position by ensuring lower transaction costs (Sheu et al., 2006). Evidence suggests that cooperative ties give businesses access to complementary resources and help them manage risk by sharing (Park et al., 2004). These relationships also increase profitability and performance by gradually building competitive advantage (Mentzer et al., 2000).

There are numerous methods to explain supply chain collaboration, but they all essentially fall into one of two categories: process focus or relationship focus. According to studies, supplier collaboration lowers the risks associated with procurement and aids the company in achieving competitive position by ensuring lower transaction costs (Sheu et al., 2006). Evidence suggests that cooperative ties give businesses access to complementary resources and help them manage risk by sharing (Park et al., 2004). These relationships also increase profitability and performance by gradually building competitive advantage (Mentzer et al., 2000).

There are numerous methods to explain supply chain collaboration, but they all essentially fall into one of two categories: process focus or relationship focus. The definition of supply chain cooperation that is most frequently used, however, is when two or more sovereign organizations collaborate to plan and carry out supply chain operations more successfully than when working alone (Simatupang and Sridharan, 2002). So, in this investigation, this definition was used.

Although the aforementioned elements can effectively explain the fundamentals of collaboration, the idea of "relationship transparency" may have significant ramifications in highly uncertain network environments where demand and procurement forecasting are not only challenging but also nearly impossible, as in manufacturing firms. However, the collaborative literature has not yet given considerable attention to this notion. The business world must be made up of a network of codependent connections that have their roots in strategic collaboration with the aim of mutual benefit (Chen and Paulraj, 2004). However, it might be argued that this word "mutual benefit" is a relative one. Until and unless complete transparency in the connection is guaranteed, who and how can it be determined whether a relationship is mutually beneficial or not? A framework (DART) was offered by Prahalad and Ramaswamy (2004), who logically stated that it was the first stage in developing a successful transactional relationship between the network actors. It wouldn't be logically absurd to assert its validity in the upstream supplier focus firm (manufacturing firm), as they described in the marketing context and emphasized being open with consumers.

2.2.4 Benefits of supply chain collaboration

2.2.4.1 Improving operational performance

Collaboration across the supply chain can increase corporate success, claim Simatupang and Sridharan (2004) and Squire et al. (2009). Businesses should be able to quadruple their efforts by collaborating with supply chain partners as opposed to doing it alone (Wilding, 2006). An

improvement in responsiveness and a rise in service quality are two results of their collaborative supply-chain methods (Holweg et al., 2005).

2.2.4.2 Increasing Service Quality

For a corporation to perform well, the supply chain must provide accurate and timely information (Holweg et al., 2005; Chen and Paulraj, 2004). Companies anticipate their supply chain collaboration programs will increase responsiveness and service levels (Cooke, 2011). The decrease in supply chain expenses related to inventory, production, and inter-firm interactions is another frequently anticipated benefit (McLaren et al., 2002).

2.2.4.3 Improving logistics performance

According to numerous studies (Nyaga et al., 2010; Robson et al., 2008), a higher level of supply chain collaboration can enhance a company's performance, particularly in terms of its logistics operations (Ha et al., 2011). Additionally, the success of the most recent collaboration may inspire additional teamwork in the future (Ramanathan and Gunasekaran, 2012).

2.2.4.4 Mitigating risks

Numerous studies have revealed that cooperation could lessen rationing and gaming in the supply chains. One of the key factors contributing to the Bullwhip effect (demand amplification; Lee et al., 2000) is due to this. Additionally, there are advantages that can only be realized with greater levels of cooperation. According to Holweg et al. (2005), these are the elimination of the Bullwhip effect, inventory reduction, improved transport capacity use, and risk mitigation.

2.2.4.5 Sustained Competitive Advantage

In a competitive business environment, firms must excel in their core capabilities to gain an advantage over their rivals (Cao and Zhang, 2011; Reuter et al., 2010). Businesses also need to

keep this advantage (Barney, 2012; Fawcett et al., 2012). To accomplish this, businesses must work closely with their supply chain partners (Christopher, 2011). The notion of Resource Based View (RBV) has significantly influenced the growth of the idea of Sustained Competitive Advantage (SCA). The capabilities produced through the management of the firm's strategic resources, in accordance with this approach, lead to SCA (Barney, 1991).

2.2.5 Factors affecting cost and benefit of supply chain collaboration

Depending on the circumstances, supply chain collaboration can have a variety of costs and benefits. First, the firm's and its supply chain partners' locations may affect both the desire for and the advantages of implementing collaborative activities (Bragg et al., 2011). Second, how well supply chain collaboration is implemented is also influenced by the management structure and corporate culture (Min et al., 2005).

2.2.6 Supply Chain Collaboration and SME Performance

Supply chain cooperation is a relationship where stakeholders cooperate, exchange knowledge, resources, and risks, and come to choices collectively to do more than they could alone. Supply chain strategies, which include decision-making procedures, joint information sharing, and risk sharing, can produce competitive benefit and higher profits than acting alone by optimizing value for all collaborators and successfully meeting consumers' expectations at a lower cost (Soosay and Hyland, 2015). Despite the fact that research mostly focuses on vertical alliances, it ignores the benefits of horizontal cooperation (Danloup et al., 2015). The relevance of supply chain cooperation is clearly acknowledged in the existing literature (Kwon and Suh, 2004). However, horizontal collaboration can also help businesses with limited resources, such as SMEs, lower costs by purchasing inputs in bulk, internationalize (Lu and Beamish 2001), and boost their

position in the market (Mina and Dagnino, 2016). However, little is known about how horizontal collaboration affects company performance.

Supply chain collaboration is not always successful in practice, despite the potential benefits. Poor information sharing, improbable collaborative plans, and inadequate contractual safeguards against partners' abusive and opportunistic behavior are challenges (Ralston et al., 2017; Ramanathan and Gunasekaran, 2014) emphasize that big businesses use their influence over smaller suppliers to force them to accept codes of conduct, which can be difficult for businesses with little clout. Smaller suppliers are compelled to cooperate and accept disadvantageous terms due to resource constraints and power imbalances, especially when major corporations stifle knowledge transfer for their own gain (Ralston et al., 2017).

Additionally, organizations who engage with external supply chains may have access to data, resources, and solutions that current partners do not (Ahuja, 2000). Additionally, anecdotal research has only been done on the anecdotal effects of circumstance on supply chain collaboration, notably in the setting of the agroindustry. Using the perspective of resource dependency theory, Dania et al. (2018) reviewed the behavioral collaboration variables for sustainable agri-food supply chains. According to Kottila and Ronni (2008), successful collaboration in the Finnish organic food business requires excellent communication that fosters the development of trust. According to research by Koh et al. (2007) on the supply chain techniques used by SMEs manufacturing, strategic collaboration directly affects operational performance. By contrasting Turkish and Bulgarian SMEs, Tatoglu et al. (2016) found affirmative evidence of the impact of collaboration on operational performance. According to research conducted by LeonBravo et al. (2017) to advance sustainability in the food supply chain, businesses should place a high priority on working with the principal players in charge of assuring the quality and safety

of their products. Alonso et al.'s (2018) study on micro and small-scale craft breweries found that horizontal collaboration among brewers increased product quality, assisted workers in learning the fundamentals of new recipes, and enhanced strategic knowledge of the sector.

2.2.7 Sustainable Supply Chain Innovation

Sustainable SCI may need innovation in distribution or in the terms of supplier contracts in order to deliver value to stakeholders. The increasing market penetration of fair-trade products is a notable example of this; it has happened despite challenges such limited store promotion, customer education, a short selection, a fragmented supply, and higher costs (Maloni and Brown, 2006). Porter and Kramer (2011) claim that fair-trade attempts to increase the portion of money that goes to suppliers, including impoverished farmers, which inexorably reduces income further downstream. Since fair-trade labeling has become standard in several product categories, customers now want comparable performance and pricing to mainstream products (Maloni and Brown, 2006; Karjalainen and Moxham, 2013).

Although consumers expect vulnerable providers to be handled decently, since price frequently takes precedence in decision-making, they might not reward such behavior. As a result, it is difficult for fair-trade manufacturers to increase operational performance because of the costs involved with fair trade, resource limitations, and relatively lower volume. Stronger supplier constraints, for example, might increase the competitiveness of brands associated with justice, but these improvements, in contrast to those in products and processes, are generally easy to duplicate, especially if suppliers are shared by competing businesses.

However, despite assertions that social responsibility may enhance supply chain performance, many companies are reticent to implement such policies unless under pressure from stakeholders

(Eltantawy, 2016). Stakeholder theory places a strong emphasis on the significance and power of stakeholders (Hoejmose et al., 2013). Saliency is a measure of a manager's awareness of and concern for a certain stakeholder group. Customers that care about social responsibility are less likely to influence managerial choices if they are thought to be a minority (Shevchenko et al., 2016). On the other hand, power refers to the degree of influence that various parties enjoy as well as the bargaining position that enables customers or suppliers to set priorities.

The challenge of identifying the right stakeholders whose concerns should be addressed is a wellknown drawback of stakeholder theory (Mitchell et al., 1997). Where stakeholders have minimal influence, supply chains might not accept their calls for more environmentally friendly manufacturing methods, such as ending child labor in mines (Hofmann et al., 2018). Government regulation and consumer pressure frequently work together to push socially responsible supply chain practices upstream in the supply chain, according to Hoejmose et al. (2013). The decision to disclose sources, select moral sources, and promote sustainable supplier growth is influenced by the trade-off between cost and reputation (Yawar and Seuring, 2017). These operations are regarded as expensive.

2.2.8 Types and Attributes of Supply Chain Collaboration

Supply chain collaboration has been divided into a number of categories (Simatupang and Sridharan, 2005). Holweg et al. (2005) classified supply chain collaboration into four forms based on inventory and planning coordination (Mena et al., 2009). However, there are two different types of supply chain collaborations: vertical collaboration and horizontal collaboration (Barratt, 2004). It is also possible to subdivide each collaboration taxon (Yang et al., 2009). Barratt's (2004) classification scheme for supply chain collaboration was used in this study because it encompasses a variety of dyadic connections between supply chain partners and serves the intended objectives

of the study. This study focuses on analyzing how supply chain innovation and collaboration impact manufacturing companies.

Collaboration in supply chains is thought to have enormous potential as a regime for controlling organizations (Stein, 1982) (Mena et al., 2009). In supply chains, there are many different ways to collaborate, including information sharing, aligning incentives, and harmonizing decision-making (Arshinder et al., 2011; Spekman et al., 1998). Supply chain integration and joint planning are examples of collaboration techniques that have evolved from coordination (Information connections), which itself evolved from cooperation (Longer-term contracts) and open market negotiation (adversarial interactions) (Stein, 1982).

Vendor Managed Inventory (VMI) and continuous replenishment programs are only two examples of the many programs that may be used to implement supply chain collaboration (Disney et al., 2003). Collaborative Planning Forecasting and Replenishment (CPFR), for example, is one of the more sophisticated forms of cooperation that can exist (Barratt, 2004). Once more, companies could improve performance by collaborating with their important partners to reduce costs and increase efficiency (Prajogo and Olhager, 2012).

Ramanathan and Gunasekaran (2012) again divided cooperation into three main components: collaborative planning, collaborative execution, and collaborative decision making. This was done in an effort to ascertain how each element will impact the collaboration's success going forward. Numerous research and situations have discussed collaboration throughout the supply chain. While some regard SCC as a process between two supply network players where they collaborate to achieve a common goal, others have highlighted SCC based on the nature of contact (Sheu et al., 2006). They agreed that it should have a long-term focus, be collaborative in nature, share

information, resources, and risks, and take into account both individual and shared goals and benefits (Golicic et al., 2003). Thus, when looking at the literature as a whole, it is evident that there are a few elements that are central to how SCC is understood fundamentally: information sharing (Manthou et al., 2004), collaborative communication (VanVactor, 2011; Cao and Zhang, 2011), incentive alignment (Simatupang and Sridharan, 2005), and goal congruence.

2.2.9 Relationship between supply chain collaboration and innovation capability

Lu and Yang (2004) assert that collaboration in corporate R&D fosters the development of novel products. Fliess and Becker (2006) used the following factors to evaluate the level of collaboration between suppliers and their partners: internal development, knowledge exchange, procurement of components or skills, authorization, contract development, coordination and other development, joint development, and joint development of contracts. According to Agarwal and Selen (2009), service organizations frequently develop new service offerings as a result of cooperative agreements that operate at the value network level. This leads to the idea of higher service offerings, which they define as new or improved service offerings that can only materialize as a result of cooperation and one that could not be.

Structural equation modeling was used to demonstrate that cooperation between stakeholders leads to the generation of higher order dynamic capabilities in services using real data from a big telecommunications business. They provided factual support for a constant process of dynamic capability creation in line with shifting business conditions. For both strategic and operational advantages on innovation capability, managers of service organizations should be aware of the potential included in these higher order skill sets, starting with collaboration, learning, and idea management. They argued that cooperation between upstream and downstream aided in the process of building trust by enhancing the performance of enterprise innovation and competition.

We draw the conclusion that supply chain collaboration and innovation are closely associated based on these earlier studies.

2.2.10 Information Sharing

One of the most significant topics that current supply chain literature has concentrated on is information exchange. This is due to the fact that knowledge sharing is a crucial intangible asset, just like money and other goods. Literature also contends that a supply chain is made up of individuals who can more effectively communicate with one another about their unique knowledge (Ojha et al., 2022; Li, 2021). Therefore, information sharing is necessary in order to succeed in the supply chain and innovation. Eslami et al. (2023) describe information sharing as the efficient use of contemporary communication tools to assist the organization and its partners in achieving goals and enhancing performance. This will be accomplished via lowering uncertainty. Information exchange enhances collaboration, coordination, and

2.3 Theoretical Review

This section focuses on providing details on two main theories that supports the research work. The study relayed on two theories deemed critical to provide theoretical underpinning. The theoretical perspectives of the study focused on social exchange theory and social exchange theory.

2.3.1 Social Exchange Theory

Since the 1920s, various fields of study have contributed to the development of the Social Exchange Theory (SET) (Cropanzano and Mitchell, 2005; Malinowski, 1932; Mauss, 1925). Homans (1961) presented it as a way to explain social behavior in dyadic and group relationships using a cost-benefit analysis of relationships. It originated with the economic theory of human behavior and was further expanded upon in anthropology, sociology, philosophy, social

psychology, and behavioral and social psychology. However, they both emphasize the interactions and relationships between the actors. This theory's applicability to the study is that it places emphasis on how businesses develop relationships with the people who make up their supply chains, as well as the norms of reciprocal benefits, according to which people behave depending on the anticipated costs and advantages of relationships (Blau, 1964).

The theory aids in the explanation and prediction of group behavior. Thus individual behaviors in the supply chain are therefore understood and explained by this theory. Understanding individual in the supply chain foster relationship and trust since issues can be addressed amicably. According to the theory, it is assumed that individuals in social interactions such as businesses are motivated by firm resources such as information and status (Blau, 2017). Individual are motivated if their partners are willing to share enough information with them. It opens up the relationship between these parties in the supply chain where there is no secrecy which could lead to mutual benefits for supply chain partners. According to SET, the relationshipal linkages between the transacting firms are dangerous when contemplating collaborative techniques (Nyaga et al., 2010; Kingshott, 2006). Therefore, it has been discovered that trust and commitment are important factors in relationships based on collaboration (Wagner et al., 2011; Nyaga et al., 2010; Griffith et al., 2006).

2.3.2 Collaborative Network Theory

The important factors affecting a firm's performance include not only how well it collaborates with its partners but also how well it collaborates with the partners' partners (Halldorsson et al., 2007). The reciprocal impact in inter-firm relationships is based on collaborative network theory (CNT) (Oliver, 1990). As a result, interactions between businesses and other participants in the various supply chain tiers are increasingly important (Hakansson and Ford, 2002).

A combination of the resources controlled by the companies can be facilitated by a strong relationship between supply chain partners. When resources are combined, outcomes surpass those of a single firm operating alone (Halldorsson et al., 2007). According to Hakansson and Snehota (1995), this combination can be classified as a supply (Cao and Zhang, 2011; Simatupang and Sridharan, 2005). Applying CNT to the current study, it makes the case that combining one resource with others can increase its value. Building strong inter-firm connections within a network or supply chain can be more crucial to attaining goals than individual firms' resource holdings, according to CNT (Halldorsson et al., 2007). As a result, CNT places a high value on the efforts made by the companies to establish fruitful working relationships with their supply chain partners (Halldorsson et al., 2007).

The important role of interpersonal compatibility among supply chain partners in determining inter-firm relationships (collaboration) is CNT. Such interpersonal dynamics include mutual trust through supply chain collaboration techniques like communication and widespread management system adoption (Oliver, 1990). Businesses can improve their performance by creating relationships with their supply chain partners through the social exchange process by developing information sharing and cooperative communication (Halldorsson et al., 2007). A network is thought to be in a state of dynamic momentum in CNT rather than at an ideal equilibrium point (Halldorsson et al., 2007). In order to control these dynamics, collaboration between businesses and their supply chain partners is necessary. This involves both processes of exchange (information, products (goods and services), and social exchange) as well as adaptation (personal, technical, legal, and logistical) and administration (Nyaga et al., 2010).

2.3.3 Resources Based View

When analyzing the connection between an organization's capabilities and resources and performance, on the one hand, and performance, on the other, the RBV theory is highly helpful (Barney et al., 2001). According to Barney et al. (2001), resources are defined as all the material and immaterial assets that companies employ to develop and carry out their varied strategies. Information sharing and relationship management are two examples of the organization's intangible resources, and both are essential for organizational responsiveness that can result in a competitive advantage. Organizations can get a competitive edge in customer development by possessing and using resources that are uncommon, valued, imperfectly replicable, and unique. The RBV has been used in previous supply chain responsiveness studies (Asamoah et al., 2021b). However, the RBV has come under fire for making the mistake of believing that business settings and resources are largely static throughout time and for failing to adequately take into consideration how competitive advantage may be maintained in quickly changing situations (Asamoah et al., 2021a). According to Singh et al. (2019), the RBV has been criticized for failing to adequately account for how competitive advantage can be maintained in quickly changing contexts and for presuming that business environments and resources are largely static throughout time. According to the RBV, an ideal position for an organization is to develop resources that not only give it a competitive edge but also support it so that it can continue to function in the event of a disruption (Asamoah et al., 2020). Building relationship in the supply chain can be considered as resources that the organization can benefit from if nurtured well.

2.4 Empirical Review

In this section, a review literature that are relevant to supply chain collaborative and innovation was conducted. It looks at the methodology, the substantive findings, and the concept used in

earlier studies with the goal of identifying knowledge gaps that the current research could address. It examined previous research in the area relevant to this study (collaborative supply chain innovation).

2.4.1 Relationship between Supply Chain Collaborative and Innovation Performance

The battle between the supply and demand markets is getting more intense in the complex and constantly shifting external environment. Supply chain collaborative innovation is gradually replacing individual enterprise innovation and replacing it as a vital component of the survival and growth of contemporary businesses. The operation of each link in supply chains needs to be made more efficient, organized, and seamless from production to consumption, and businesses urgently need to break through the bottleneck parts that limit individual development. By doing this, the supply chain and the various businesses would be able to achieve long-term sustainable development goals. The effectiveness of supply chains is significantly influenced by core enterprise collaborative innovation, according to a Goldman Sachs study on the effects of the SinoUS trade war. According to Lii and Kuo's (2016) research, supply chain integration, sustainable competitiveness, and overall performance are all positively impacted by a collaborative innovation mindset. According to Yang et al. (2011), collaborative supply chain innovation and lean production can result in improved economic and environmental performance.

Dey et al. (2018) suggested that collaborative supply chain innovation through lean production might minimize waste, improve quality, lower costs, and boost supply chain flexibility. Sezen and Ankaya (2013) discuss how technical innovation, particularly the development of green and ecological technology, has a favorable impact on the performance of sustainable development for businesses. According to Versaavel (2002), the supply chain's member companies' sporadic technological synergy have little bearing on how well innovations perform. Contrarily, the tight

collaboration that links technical innovation together is more advantageous for enhancing the performance of sustainable supply chains.

According to Kim et al. (2018), information technology-based integration between virtual firms can be used as an efficient governance tool for suppliers, which can strengthen cross-border supply chain partnerships and boost overall performance. According to Gemnden et al. (1996), early supplier involvement in product innovation projects can also lower the number of expensive design changes made later on, shorten the innovation project development cycle, and increase development effectiveness. Therefore, supply chain performance (SSCP) is positively impacted by supply chain management collaborative innovation (SCMNCI).

The use of information technology to manage the supply chain process and enhance performance has continued to be a top goal for businesses, as Lindgreen et al. (2018) also note. Supply chain collaboration in management innovation, as demonstrated by Vachon and Klassen (2008) and Wu (2013), significantly improves performance. A straightforward management coordination method, according to Savaskan et al. (2004), can encourage shops to recycle products, improving the environmental performance of the entire supply chain. Cruz (2013) shows how, by working together to manage the social responsibility of upstream and downstream businesses in a supply chain, the top companies can reduce supply-side interruption risk, social risk, and demand-side uncertainty, thereby enhancing the social performance of sustainable supply chain development. Consequently, supply chain technology collaborative innovation (SCTCI) has a favorable effect on the performance of the sustainable supply chain (SSCP).

According to Yang et al. (2011), collaborative innovation in management is positively correlated with the performance of innovative enterprises, whereas collaborative innovation in marketing has a U-shaped relationship with that performance and is positively correlated with the performance

of mature enterprises. Additionally, the combination of management innovation with marketing innovation enhances the performance of established businesses. As a result, supply chain performance (SSCP) is positively impacted by supply chain market collaborative innovation (SCMKCI).

Given this, collaborative innovation is more likely to have an impact on the performance of the entire supply chain than individual invention does. To put it another way, supply chain innovation refers to the cooperative innovation of technology, management, and market among supply chain member enterprises based on mutual trust, which can improve the level of sustainable supply chain performance by realizing the accurate matching and efficient operation of supply and demand from the purchase of raw materials, product creation, design, and manufacturing, to sales, distribution, and so on.

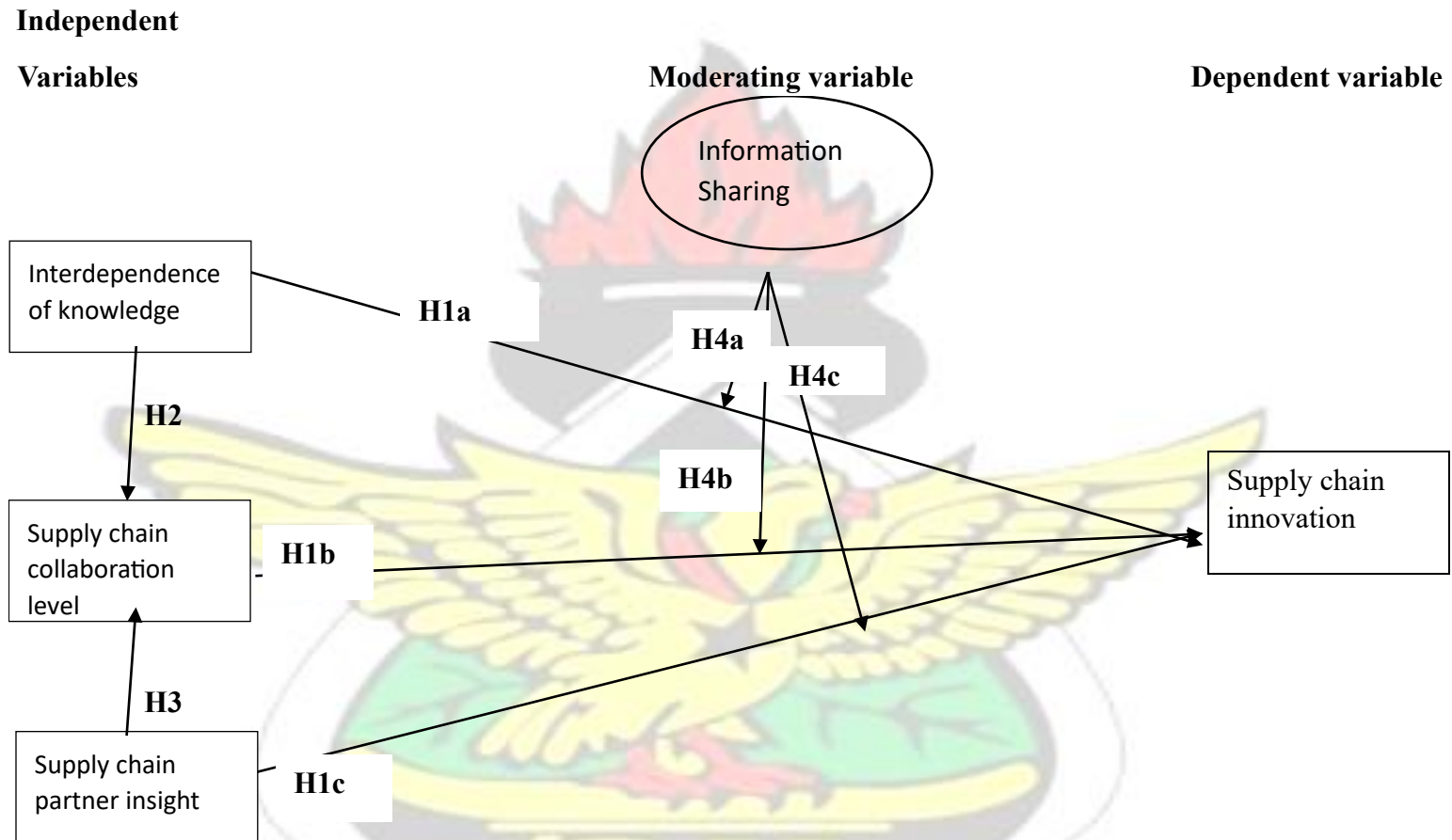
2.4.2 The moderating role of information sharing on the effect of supply chain collaboration and supply chain innovation

The literature on the moderating impact of information sharing on the relationship between supply chain collaboration and supply chain innovation in a subset of manufacturing enterprises is the main subject of this section. In their conceptualization of how supply chain relationship quality affects knowledge sharing and firm innovation performance, Li et al. (2021) found that both explicit and tacit knowledge sharing and other mediators play a role in how supply chain relationship quality affects firm performance. Eslami et al. (2023), among others, noted that knowledge exchange across supply chain participants has an impact on how industry 4.0 technologies are adopted. This shows that the impact of supply chain collaboration on supply chain innovation is influenced by information sharing.

In addition, Ojha et al. (2022) investigated the mediating function of knowledge channels and information sharing in a relationship between buyer-supplier and innovation speed. This study discovered that knowledge sharing is favorably correlated with innovation speed, and that knowledge sharing fully mediates the relationship between buyer-supplier interchange and innovation speed. Additionally, the relationship between a buyer-supplier exchange and innovation pace is immediately increased and positively moderated by information sharing across business units. This indicates how information sharing is essential for mediating the connection between a buyer-supplier interaction and innovation speed. Information sharing was once more envisioned by Abdulameer and Yaacob (2020) as a moderator between a lean supply chain and supply chain performance. Nguyen and Prentice (2022), who looked at supply chain collaboration, concluded that utilizing structural equation modeling, information sharing had a considerable impact on business performance.



2.5 Conceptual Framework



Source: Adapted from Zacharia, Nix and Lusch (2009)

2.6 Hypotheses Development

2.6.1 Supply Chain Collaboration and Supply Chain Innovation

As supply chain collaboration advances, businesses increasingly reach out to suppliers beyond their immediate supply chain, including rivals and suppliers on the second, third, tiers (Erzurumlu, 2010). Companies may use innovation as a tool to create new or improved products, services, or processes in order to expand, compete, and successfully differentiate themselves in their market (Baregheh et al., 2009). Innovation could involve the methods used to produce and transport goods and services (i.e., the main procedure used in the supply chain), the market, which is the setting in which goods and services are launched, as well as modifications to the mental model that underpins the organization's work (Tidd et al., 2005; Solaimani and van der Veen, 2022). In collaborative dalliances, supply chain partners test radical ideas outside their normal relationships. These radical ideas could offer firm the bases of innovation that they use to outplay their competitors. By decreasing contracting costs, communicating often, enhancing coordination, and taking a cooperative approach to operational problem-solving, collaboration lowers purchasing costs (Cannon and Homburg, 2001). A combination of the resources controlled by the companies can be facilitated by a strong relationship between supply chain partners. When resources are combined, outcomes surpass those produced by a single firm acting alone (Halldorsson et al., 2007). Collaborative Network Theory (CNT) states that as a supply chain moves up the value chain, interactions between companies and other participants become increasingly significant (Hakansson and Ford, 2002). Therefore, the CNT makes the case that the vitality of these resources arising from collaboration can be applied to creative tasks within the company.

In especially during exceptional occurrences like the Covid-19 epidemic, collaboration helps supply chain innovators "to learn from customers, partners, and industry and to install new

practices, processes, and products that will differentiate their business for the future." 2020 (Clark et al.). Working with the company's supply chain partners may be a rich source of the much-needed innovation, according to Paasiet al.'s (2010) results.

According to the literature (Soosay et al., 2008), teamwork is associated with supply chain innovations. Collaboration is necessary for activities that promote innovation, such as cooperative product development and design for manufacturing though it is not an easy process (Yuen and Thai, 2017). By conducting its own R&D and absorbing part of the R&D expenditures that the purchasing business would otherwise have to bear, suppliers can support firm innovation.

Additionally, supply chain partners could possess important information about the manufacturing and fulfillment procedures that affect a company's performance. These partners can provide concepts for improved goods characteristics that could help the company improve their operation process (Corsten and Felde, 2005). The exchange of implicit and explicit information is made easier by supplier collaboration, which also boosts knowledge generation and innovation spillovers from the supplier (Inkpen, 1996). Simatupang and Sridharan (2005) showed in a study that supply chain participants with higher degrees of collaborative practices had better operational performance and innovative activities. Lapide (1999), also attested to the fact that supply chain collaboration boost innovation. The study therefore hypothesises that:

H1a+: Interdependence of knowledge has a positive and significant relationship with supply chain innovation

H1b+: Supply chain collaboration level has a positive and significant relationship with supply chain innovation

H1c+ Supply chain partner insight has a positive and significant relationship with supply chain innovation

2.6.2 Independence of Knowledge, Supply Chain Collaboration Level and Supply Chain Partner Insight

Cooperation is a method of managing interdependencies that involves talking to each other and working together to strike a balance between personal objectives and group objectives. Each company can make adjustments that are advantageous to one or both enterprises by simply exchanging information about specific requirements and desires, all while attempting to limit any adverse effects on the other. A strategy to managing interdependencies known as collaboration calls for the sharing of knowledge and a much higher level of cooperative goal-setting, information exchange, and decision-making with the intention of advancing both shared and individual goals. According to RBV theory, buyers and suppliers should work together to access the information or expertise found in other organizations. A single firm very frequently lacks the knowledge required for complex problem-solving in an era of rapidly evolving technology, dynamic growth of knowledge, and highly specialized expertise; as a result, collaboration with a firm that brings the necessary expertise is likely to emerge (Hara et al. 2003). The greater the incentive the firms have to work closely together, the more interconnected they are, and the better they know and understand one another. According to several experts, there is a propensity for a deeper and more intense level of collaboration as organizations become more reliant. Companies can produce value for both parties when they recognize their interconnectedness (Spekman et al., 1997). The idea of interdependence can be brought on by collaboration-specific investments and the perception of significant exit costs, according to Spekman et al., (1997). Higher levels of dependency are associated with an improvement in coordination and collaborative output, according to Blankenburg-Holm et al. (1999). If a firm believes that the success of the other firm depends on

its knowledge and activities, then a higher level of collaboration can be expected from the two firms. From low level or weak collaboration to high level or strong collaboration, there are several levels of collaboration. High degrees of commitment, multiple collaborative activities, overlapping operations, and relationships that result in changes to each other's organizations can all be used to describe high levels of collaboration (Kanter 1994). Firms that are actively collaborating are willing to take decisions together, adopt new procedures, and establish shared objectives for the cooperation effort, all of which call for an open flow of ideas and information. Openness to new ideas and methods of operation as well as a shared decision-making process are characteristics of high levels of collaboration that each organization must invest time and resources in (Lee and Choi 2003). Based on this, the study proposed that:

H2+: Interdependence of knowledge has a positive and significant relationship with supply chain collaboration level.

H3+: Supply Chain Partner Insight has a positive and significant relationship with supply chain collaboration level.

2.6.3 Supply Chain Collaboration, Supply Chain Innovation and Information Sharing

According to Swink (2006), an organization's ability to collaborate "is key to its innovative success," and many companies are implementing new organizational structures, communication technologies, and incentive systems to promote information sharing in order to increase their collaborative potential in critical areas. According to the RBV, information sharing can be viewed as a resource and a capacity. In the context of information sharing amongst supply chain partners, IT refers to applications that include hardware, software, networks, data management, and IT support services. Eslami et al. (2023) describe information sharing as the efficient use of

contemporary communication tools to assist the organization and its partners in achieving goals and enhancing performance. In order to facilitate decision-making, speed up business operations, and enhance cooperation and communication both within an organization and with external partners, it is a competency that integrates its resources to collect, process, and transmit data (Wang et al., 2015). According to recent study, the creation of an information sharing capability has the potential to facilitate knowledge cooperation and innovation since it promotes supply chain collaboration (Randhawa et al., 2017). By enhancing the resources of participants who are at the same level of the value chain (horizontal integration) or gaining knowledge from important sources either upstream or downstream of the supply chain (vertical integration), information exchange is advantageous to those looking for innovation (Lamming, 1993; Spekman et al., 1998). This is due to the fact that knowledge sharing is a crucial intangible asset, just like money and other goods.

As an illustration, external collaboration-based innovation techniques can result in improved innovation outcomes (Cassiman and Veugelers, 2006; Mol and Birkinshaw, 2014), and information sharing is used to support such collaborative efforts (Fawcett et al., 2011). Computers, laptops, phone and data networks, as well as communications tools (such as email) that serve as a medium for information sharing, all play a critical connective role in facilitating the exchange of information to and from supply chain partners involved in cooperative activities. Information exchange is essential for cooperative innovation projects (Majchrzak et al., 2005). It enhances communications between supply chain participants, which might result in a creative agenda (Reid et al., 2016). Businesses must adopt efficient information sharing capabilities in order to realize the value of supply chain collaboration in innovation to support their strategic growth.

By using the resource-based perspective (RBP) that Barney (1991) and Barney et al. (2011) developed, it is possible to describe knowledge sharing as a skill that is related to creativity. The

firm's information sharing capabilities, according to the RBV, serve as the cornerstone for developing and enhancing its skills through continual, collaborative learning (Powell et al., 1996). Information sharing competency is a key element of supply chain innovation because it provides the communication platform for information exchange and collaboration that enables supply chain partners (Fawcett et al., 2011). Open, frequent, balanced, two-way communication at all levels is one of the key components of a collaborative supply chain collaboration. Information sharing helps supply chain partners increase their capacity for innovation by fostering relationships based on mutual respect, dependability, interdependence, and cultural affinities. This is due to the fact that finding better inter organizational relationships that can encourage innovation is the key to efficient supply chain management.

The social exchange theory assumed that individuals in social interactions are motivated by resources of trade such as information (Blau, 2017). The social exchange theory therefore agree that in human settings like business, information sharing is key for businesses to undertake critical and valuable initiatives. These initiatives could be innovativeness among these partners in the business with the aim of improving their operations for a common goal. The study therefore states that:

H4a+: Information sharing moderates the relationship between Interdependence of knowledge and Supply Chain Innovation

H4b+: Information Sharing moderates the relationship between Supply Chain Collaboration level and supply Chain Innovation

H4c+ Information Sharing moderates the relationship between Supply Chain Partner Insight and Supply Chain Innovation

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The study's primary goal is to investigate how information sharing plays a moderating role in the relationship between supply chain collaboration and creativity. The methods used to gather data are the main focus of this chapter. The chapter primarily focuses on outlining the processes and actions that were utilized to gather the data required to establish the relationship between the variables. It focuses on the analytical instrument that was employed to gather and analyze the data in order to accomplish the research's goal.

3.2 Research Design

The choice of a specific research design is influenced by the goals of the study, the questions that will be asked, and the data that will be useful in achieving those goals. A framework for data collection and analysis is provided by a research design (Bryman, 2012). According to Saunders et al. (2009), a research design is a strategy for deciding on data collecting, data measurement, and data analysis.

In this study, the explanatory research design was used. Explanatory research is a technique for gathering information in order to explain a phenomenon (Dulock, 1993). It is the responsibility of the researcher to gather further data because the phenomenon under study started with a single piece of information. Explanatory research is a technique used to analyze phenomena (situations worth researching) that have not before been researched or have not been adequately explained. It is a procedure whose goal is to determine what might serve as a feasible solution to the issue.

This method of research enables you to find out what does not work as well as what does and once you have found this information, you can take measures for developing better alternatives that would improve the process being studied (Dulock, 1993). The goal of explanatory research is to answer the question “How,” and it is most often conducted by people who want to understand why something works the way it does, or why something happens as it does.

3.3 Research Method

A research method could either be quantitative, qualitative or a combination of both. A qualitative method is more focused on a thorough investigation and comprehension of the phenomenon within the study's context. The quantitative method is concerned with defining the relationship between variables and dealing with numerical values such amount, quantity, frequency, or intensity (Bryman, 2012). A formal, objective, systematic procedure to characterize and test correlations as well as look at cause-and-effect interactions among variables can also be referred to as a quantitative research approach (Burns & Grove, 1993). The descriptive survey approach was used in this study because it was appropriate for gathering and analyzing the data needed to satisfy the study's objectives.

3.4 Research Population

All elements (people, things, and events) that satisfy the sample requirements for inclusion in a study are referred to as the population (Badger and Werrett, 2005). The population of the study comprises of manufacturing firms: executive officers, and the owners of these manufacturing firms in Ashanti region.

3.5 Sample Size and Sampling Technique

According to Saunder et al. (2009), the suitability of the sampling strategy is just as important to the quality of any research as the fit of the research method and instrument. According to Singh

(2006), there is no set formula for calculating the sample size. According to many authors, including Pallant (2007) and Hair et al. (2012), the appropriateness of a sample size is determined by the statistical analysis that will be used. The study used a simple random sampling method. This method is a type of probability sampling where the researcher chooses a sample of individuals at random from a larger population. Every person in the population has the same chance of being chosen. Based on the questionnaire used and the rule of five, this research employed a sample size of one hundred and fifty (150) respondents. The research sampled 150 manufacturing firms: 3 respondents from each firm.

3.6 Data Collection Instrument

There are numerous tools available to collect data for the study. Secondary data were used to conduct an extensive review of pertinent literature. Articles, books, and other sources were used as secondary sources of data for the study. Data collection was done using questionnaire, according to the researcher. After carefully evaluating the goals and nature of the research, the questionnaire was chosen as the data gathering tool. The modified questionnaire was organized such that it would be simpler for the respondents to read and comprehend. A 5-point Likert scale of measurement which ranges from strongly disagree to strongly agree was employed in order to measure the constructs with Where 1 indicates Strongly Disagree, 2 indicates Disagree, 3 is Neutral, 4 indicates Agree and 5 indicates Strongly Agree. The section A focuses on the demographics of the respondents whilst section B concentrates on the supply chain innovation. Section C looks at the interdependence of knowledge whilst Section D focuses on supply chain partners. Section E focuses on the collaboration level whilst Section F looks at information sharing.

Table 3.1: Measures of Constructs

Construct	Items/Measures	Source
Supply chain innovation (SCI)	<ul style="list-style-type: none"> • This firm offers new combinations of products. • This firm offers an innovative customized product • This firm consistently introduces new product items. • This firm offers new flavors. • This firm offers innovative presentation of products. 	Kim et al. (2018)
interdependence of knowledge (IK)	<p>The organizations involved:</p> <ul style="list-style-type: none"> • were dependent upon each other for an effective solution • needed knowledge the other possessed • needed skills the other possessed • needed each other to reach their goals 	Jap (1999)
Supply chain partner (SCP)	<p>Prior to this collaboration my organization had an understanding about our partner's:</p> <ul style="list-style-type: none"> • skills and capabilities • business model • business risks • products • processes • business objectives • communication style • industry jargon • organizational culture 	Zacharia, Nix and Lusch (2009)
Collaboration Level (CL)	<p>The organizations involved:</p> <ul style="list-style-type: none"> • used intensive collaborative planning • made joint decisions on most issues • jointly set goals for the collaboration effort 	Lee and Choi (2003)
	<ul style="list-style-type: none"> <input type="checkbox"/> throughout this collaboration, there was a free of useful ideas <input type="checkbox"/> throughout this collaboration, there was openness to discovering new knowledge 	

	<input type="checkbox"/> throughout this collaboration, there was an openness to ways to improve joint performance	
Information Sharing (IS)	<input type="checkbox"/> details of the information are clearly explained <input type="checkbox"/> the required information is appropriately given <input type="checkbox"/> The necessary information is given so everyone could perform his or her duties. <input type="checkbox"/> All service-related questions are adequately answered	Yi and Gong (2013)

3.7 Data Collection Procedures

The instruments were modified, and structures had already been verified in earlier research. Since they expose variables for the suitable constructions, it was vital for the researcher to review them. Those who hold positions like executive officers and owner-managers served as the study's respondents. This is because those people are thought to be familiar with the processes and relationships that exist between their individual firm's internal and external parties. These respondents were approached by the researcher at the business' location, and they voluntarily filled out the surveys. In the months of January and February 2023, four weeks of data were collected.

3.8 Data Analysis

The information received from respondents of the different groups allowed for a conclusion to be made. The data that were gathered were assembled and properly examined. The data were entered using SPSS version 21 of the statistical software for social science (SPSS). Demographics were examined using descriptive and inferential statistics. Correlation and regression analysis were utilized to analyze the data.

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CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents the demographics of the respondents, the descriptive statistics, reliability results, validity results, the regression results and summary of hypotheses. The chapter completed with the discussion of the results

4.2 Demographic Features of Respondents

This section concentrates on the demographic features of respondents including gender, age, educational level, management level, the work experience, years of company existence and many others. The result is presented in Table 4.1. Four hundred and fifty (450) questionnaires were administered and 438 of them were retrieved and were valid for analysis. This demonstrates a response rate of 97.3 percent.

Table 4.1: Demographic Features of Respondents

	Details	Frequency & Percentages (%)	Total
Gender	Male	283 (64.60%)	438 (100%)
	Female	155 (35.4%)	
Age	18 to 25 years	61 (14.00%)	437 (100%)
	26 to 35 years	137 (31.40%)	
	36 to 45 years	15 (35.90%)	
	46 to 55 years	59 (13.50%)	

	Above 55 years	23 (5.30%)	
Educational Level	HND	38 (8.70%)	437 (100%)
	Professional Certificate	68 (15.80%)	
	Bachelor Degree	192 (43.90%)	
	Postgraduate	133 (30.40%)	
	PhD	5 (1.10%)	
Management Level	Lower Level	80 (18.30%)	438 (100%)
	Middle Level	265 (60.50%)	
	Top Level	93 (21.20%)	
Number of Years Working in Organization	1 year and below	29 (6.70%)	436 (100%)
	2 to 4 years	142 (32.60%)	
	5 to 8 years	195 (44.70%)	
	9 to 10 years	44 (10.10%)	
	Above 10 years	26 (6.00%)	
Years of Company existence	Below 11 years	60 (13.70%)	438 (100%)
	11 to 20 years	189 (43.15%)	
	21 to 30 years	124 (28.31%)	
	31 to 40 years	36 (8.22%)	
	41 to 50 years	19 (4.34%)	
	Above 50 years	10 (2.28%)	
Company have dedicated Supply Chain Department	Yes	426 (97.50%)	437 (100%)
	No	11 (2.50%)	

Source: Field Survey (2023)

From Table 4.1, it is observed that 64.6 percent (283) of the respondents are males whilst 35.4 percent of them are females. This shown that majority of the respondents are males. Also, 4 percent of them are within the age of 18 to 25 whilst 31.44 percent of them are between the ages of 26 to 35. Also, 35.9 per cent of the respondents are within the ages of 36 to 45 years whilst 13.5 percent are between the ages of 46 to 55 years. Finally, 5.3 percent of them are above the age of

55. This demonstrated that majority of them are within the ages of 36 to 45. Furthermore, 8.7 percent of the respondents are HND holders whilst 43.9 percent of them are holders of professional certificate. 30.4 percent of them hold bachelor's degree whilst 1.1 percent hold a PhD.

In addition, from Table 4.1, the result shows that 18.3 percent of them are at the lower level whilst 60.5 percent of the respondents are middle level managers. 21.2 per cent of the respondents are top level managers. This shows that the majority of respondents are middle level managers. 6.7 percent of the respondents have worked for less than a year whilst 32.6 percent of them have worked for 2 to 4 years. Also, 44.7 per cent of them have worked for 5 to 8 years whilst 10.1 percent of them have worked for 9 to 10 years. Finally, 6 percent of them have worked for more than 50 years.

Also, 13.7 percent of the respondents are from firms that have existed for less than 11 years whilst 43.1 percent of them are from firms that have existed for 11 to 20 years. 28.3 of them work in firms that have existed in firms that have existed for 21 to 30 years whilst 8.2 percent of the respondents work in firms that have existed for 31 to 40 years. 2.28 percent of them work in firms that have existed for 50 years. Lastly, 97.5 percent of the firms have dedicated supply chain department whilst 2.5 percent do not have a dedicated supply chain department

4.3 Descriptive Statistics

A data set, which may be a representation of the entire population or a portion of it, is described using descriptive statistics, which are a collection of succinct descriptive coefficients. In research, descriptive statistics are used to characterize the basic properties of the data (William, 2006). The primary objective is to present a summary of the samples and measurements made throughout a research study. The descriptive analysis for the various buildings are displayed in the following table.

4. 3.1 Supply Chain Collaboration

Supply chain collaboration being the independence variable, it was necessary for it to be measured.

It was therefore measured as a multi-dimensional construct. Items were adopted from Zacharia, Nix and Lusch (2009). A 7 – point scale with 1 = strongly disagree to 7 = strongly agree was employed to measure the items. Below are the various dimensions of supply chain collaboration.

4.3.1.1 Interdependence of Knowledge

Interdependence of Knowledge is one of the sub constructs that was measured in the study. As can be seen in the table below, all the items (except one) have a mean value above 5.0 which represents ‘agree’ on the Likert scale. All the respondents have agreed to the said activities that exist between them and their partners. On the other hand, when it comes to appreciable knowledge about their customers, respondents were neutral.

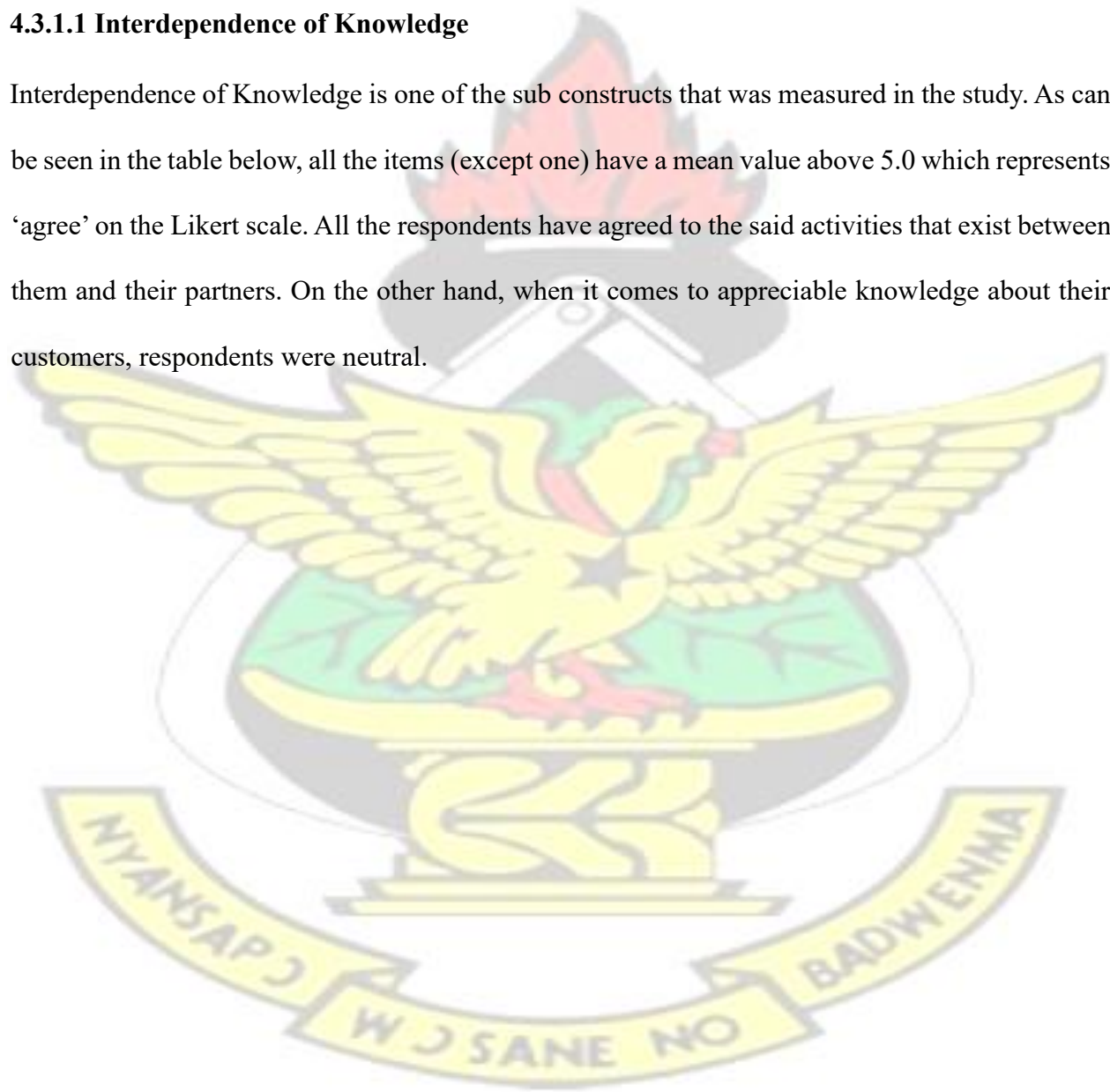


Table 4.1 Interdependence of Knowledge

	N	Min	Max	Mean	Std. Dev
Our organization has an appreciable knowledge about our partners skills and capabilities	433	1	7	5.50	1.262
Our organization has an appreciable knowledge about our partners business model	433	1	7	4.97	1.337
Our organization has an appreciable knowledge about our partners business risks	435	1	7	5.29	1.157
Our organization has an appreciable knowledge about our partners products	436	1	7	5.11	1.126
Our organization has an appreciable knowledge about our partners' processes.	434	1	7	5.04	1.173
Our organization has an appreciable knowledge about our partners' business objectives.	436	1	7	5.26	1.102
Our organization has an appreciable knowledge about our partners' communication style.	437	1	7	5.24	1.136
Our organization has an appreciable knowledge about our partners' industry jargon.	434	1	7	5.23	1.213
Our organization has an appreciable knowledge about our partners' organizational culture.	434	1	7	5.22	1.120

Source: fieldwork, 2023

4.3.1.2 Supply Chain Partnership Insight

Supply chain partnership being one of the sub-dimensions of supply chain collaboration, items were adopted from literature to measure it as well. The findings revealed that three items have mean values of 5.42, 5.24 and 5.26 which represent 'agree' on the Likert scale. It shown that, with regards to those activities, respondents have agreed that they happen in their organizations. However, there was only one item that has a mean value of 4.95 illustrating neutral on the likert scale.

Table 4.2: Supply Chain Partnership Insight

	N	Min	Max	Mean	Std. Dev
Our relationship with our suppliers and our customers requires that we are dependent on each other for effective solution	436	1	7	5.41	1.307
Our relationship with our suppliers and our customers requires that the needed knowledge are the other possessed.	431	1	7	4.95	1.299
Our relationship with our suppliers and our customers requires that the needed skilled are the other possessed	436	1	7	5.14	1.138
Our relationship with our suppliers and our customers requires that we need each other to reach their goals	436	1	7	5.26	1.109

4.3.1.3 Supply Chain Collaboration Level.

Supply chain collaboration level as a sub-dimensional variable was also measured with adopted items from literature as well as a 7-point scale which was adopted. It can be seen from table 4.3 that all the items have a mean value above 5.0. The explanation of these values is that, it means that, most of the respondents have agreed that the said collaboration activities happen in their organizations. Respondents therefore attested that, there is supply chain collaboration level in their organizations since the mean values represent ‘agree’ on the Likert scale.

Table 4.3: Supply Chain Collaboration Level

	Std.	N	Min	Max	Mean	Dev.
Our relationship with our suppliers and our customers requires that we use intensive collaborative planning.		434	1	7	5.37	1.221
Our relationship with our suppliers and our customers requires that we make joint decisions on most issues		432	1	7	5.03	1.317
Our relationship with our suppliers and our customers requires that we jointly set goals for the collaboration effort.		435	1	7	5.16	1.188
There is free useful ideas for organizations involved throughout the collaboration.		435	1	7	5.19	1.108
There is openness to discover new knowledge for organizations involved throughout the collaboration.		434	1	7	5.28	1.091

There is openness in ways to improve joint performance for organizations involve throughout the collaboration.	434	1	7	5.38	1.035
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Source: field work, 2023

4.3.2 Information sharing

Information sharing was used as a moderating variable in this study. Measurement items were adopted from literature to measure the construct. A 7-point scale was also adopted from literature. The preliminary analysis shows that all the items have a mean value of 5.0 or above. This explains that, most of the respondents have agreed to the fact that all the information sharing activities raise in the table are being carried out by the organizations under study. This is because they have a mean value than 5.0 which represents ‘agree’ on the Likert scale.

Table 4.5: Information sharing

	N	Min	Max	Mean	Std. Dev
Details of information are clearly explained	437	1	7	5.36	1.212
The required information is appropriately given	435	1	7	5.04	1.286
The necessary information is given so everyone could perform his or her duties.	435	1	7	5.34	1.040
All service-related questions are adequately answered	435	1	7	5.30	1.069

Source: fieldwork, 2023

4.3.1.2 Supply Chain Innovation

Supply chain innovation being the outcome variable, it was necessary for it to be measured as well. Items were adopted from literature with a 7-point likert scale. In other to know whether the firms practice innovation in their supply chain, respondents were asked the following questions. As can be seen in table 4.3, new combination of products, the ability of the firm to offer new flavors and other firms offering innovative presentation products have 5.06, 5.15 and 5.04 respectively which

signifies ‘agree’ on the likert scale. It therefore explains that, respondents have agreed that the said activities are being practice in their organizations. As to whether the firms offer customized innovative products as well as the consistency at which firms introduce new products, respondents were indecision hence the mean value of 4.81 and 4.91 respectively

Table 4.6: Supply Chain Innovation

	N	Min	Max	Mean	Std. Dev
Our firm offers new combinations of products	438	1	7	5.06	1.370
Our firm offers an innovative customized products	436	1	7	4.81	1.393
Our firm consistently introduces new product items.	438	1	7	4.91	1.252
Our firm offers new flavors	437	1	7	5.15	1.201
<u>Our firm offers innovative presentation of products.</u>	<u>437</u>	<u>1</u>	<u>7</u>	<u>5.04</u>	<u>1.177</u>

Source: fieldwork, 2023

4.4 Correlation results

The study further used correlation test to determine the relationship between the variables before further analysis could be done. The study wanted to see if there is a strong or weak correlation between the variables under study. As can be seen from table 4.8 below, the result shown that there is strong correlation between information sharing and supply chain innovation at .354^{**}, a strong correlation between supply chain partnership insight and supply chain innovation .479^{**}, a strong relationship between supply chain collaboration and supply chain innovation at .493^{**}. The other strong correlation is 506^{**}, .445^{**} and .544^{**}. However, there is a weak correlation at .108^{*}, .100^{*}, and .095^{*} while there is no correlation between supply chain innovation and interdependence of knowledge at 0.091.

Table 4.7: Correlation Results

	IK	SCI	IS	SCPI	SCL
IK	1				
SCI	0.091	1			
IS	.095*	.354**	1		
SCPI	.100*	.479**	.506**	1	
SCL	.108*	.493**	.445**	.544**	1

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

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

Note: IK = Interdependent of knowledge, SCI = Supply chain innovation, IS = Information sharing, SCPI = Supply chain partnership insight, SCL = Supply chain collaboration level

3.5 Validity and reliability

Validity is the question of whether an indicator or group of indicators created to measure a concept actually do so. Reliability was defined by Bryman (2012) as the constancy of a measure of purpose. Concerns about measure consistency are part of reliability. When it comes to developing, analyzing, and, to some extent, rating the quality of the study, validity and reliability are two distinctive characteristics that must be acknowledged in any research study, particularly with respect to quantitative investigations. Therefore, it is crucial that every design, data collection method, and assessment technique employed in the study are trustworthy and valid; else, the study would be written off as being fruitless. The Cronbach alpha value was used to evaluate the measures' validity and reliability. Additionally, the internal consistency was examined. For the study, a Cronbach alpha of 0.7 or higher is considered to be favorable.

Table 3.2: Reliability Test

Constructs	Cronbach alpha
SC	0.767
IK	0.728
SCP	0.747
CL	0.726
IS	0.776

The rule is for Cronbach alpha to be in the acceptable level of reliability, it should range between 0.6 and 0.95. if above 0.95 may not good because may give indication of redundancies (Hulin, Netemeyer and Cudeck, 2001). From the above, all Cronbach alpha are the Cronbach alpha are above 0.6 the data is reliable.

4.6 Regression Results

The linear regression model was used to determine the direct link between supply chain collaboration and supply chain innovation. The table below shows the regression results of the study. Firm size and firm age were used as control variables to mitigate their effects on the findings. Interdependence of knowledge was regressed on supply chain innovation. The results revealed that, there is a positive and significant link between independence of knowledge and supply chain innovation at ($\beta = .315$, $T = 10.206$) with $p = 0.000$. The results also shown changed in $r^2 = 0.26$ which explains that, interdependence of knowledge (independent variable) accounted for about 26% of supply chain innovation. The link between supply chain collaboration level and supply chain innovation was also determined. It was revealed that there is a significant and positive link between supply chain collaboration level and supply chain innovation at ($\beta = .338$, $T = 7.339$) which $p = 0.000$. The results further shown that, $r^2 = 0.233$ which explains that supplier collaboration level accounted for about 23.3% of the outcome variable (supply chain innovation).

In determine the relationship between supply chain partner Insight and supply chain innovation, the results revealed that there is a positive and significant link between the two variables where $\beta = 0.251$, $T = 4.235$ and $P = 0.000$. The results also shown that, supply chain partner insight accounted for about 35.8% ($r^2 = 0.358$) of supply chain innovation. Similarly, supply chain partner insight has a positive and significant relation with supply chain collaboration level with $\beta = 0.444$, $T = 12.483$ and $P = 0.000$. Supply chain partner insight also accounted for about 27.4% ($r^2 = 0.274$). However, Interdependence of knowledge does not have a positive and significant link with supply chain collaboration level at ($\beta = .002$ and $T = 1.454$) with $p = 0.18$. The findings are similar to Zacharia, Nix and Lusch (2009) which could be as a result of similar demographic characteristics of the respondents.

Table 4.9: Regression Results

	Supply chain Innovation				Supply Chain Collaboration Level	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm Size	.040(2.115)	.017(.991)	.010(.609)	.007(.437)	.047(2.188)	.019(1.039)
Firm Age	.419(1.856)	.288(1.431)	.308(1.631)	.295(1.598)	.076(.309)	-.060(-.286)
IK		.315(10.206)	.		.002(1.454)	
SCL			.338(7.339)	.		
SCPI				.251(4.235)		0.444(12.483)
R	0.161	0.483	0.572	0.598	0.158	0.547
R-Square	0.026	0.233	0.328	0.358	0.25	0.299
R-Square	0.26	0.094	0.094	0.030	0.025	0.274
Changed						
Sig	0.35	0.000	0.000	0.000	0.18	0.000

Source: fieldwork, 2023

Note: IK = Interdependent of knowledge, SCI = Supply chain innovation, IS = SCPI = Supply chain partnership insight, SCL = Supply chain collaboration level

4.7 Test for Moderation

4.7.1 Interdependent of Knowledge, Information Sharing and Supply Chain Innovation

The influence of an independent variable X on a dependent variable Y is moderated by the variable M, according to Hayes (2017, p. 208), if its magnitude, sign, or strength depends on or may be anticipated by M. In that situation, M is referred to as a moderator of X's effect on Y or as an interaction between X and M in influencing Y. For there to be a moderation, the interaction effect must be significant. Since the interaction effect is not significant thus $p = 0.2839$, there is no moderation. The model also shown a size of the moderation was also demonstrated by R^2 -chgng as 0.0024.

Table 4.10: Moderation Effect of IS on IK and SCI

Dependent Variable: SCI

Model Summary						
R	R-sq	MSE	F	df1	df2	p
.3614	.1306	15.0468	20.9308	3.0000	418.0000	.0000
Model						
	coeff	se	t	p	LLCI	ULCI
constant	16.9616	1.7339	9.7823	.0000	13.5533	20.3698
IK	-.0091	.0101	-.8984	.3695	-.0290	.0108
IS	.3792	.0799	4.7435	.0000	.2221	.5364
Int_1	.0005	.0004	1.0731	.2839	-.0004	.0014

Product terms key:

Int_1 : IK x IS

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0024	1.1515	1.0000	418.0000	.2839

Note: IK = Interdependent of knowledge, SCI = Supply chain innovation, IS = Information sharing, SCPI = Supply chain partnership insight, SCL = Supply chain collaboration level

4.7.2 Supply Chain Collaboration Level, Information Sharing and Supply Chain Innovation

As indicated previously, the influence of an independent variable X on a dependent variable Y is moderated by the variable M, according to Hayes (2017, p. 208), if its magnitude, sign, or strength depends on or may be anticipated by M. In that situation, M is referred to as a moderator of X's effect on Y or as an interaction between X and M in influencing Y. Information sharing cannot moderate the relationship between supply chain collaboration level and supply chain innovation if the interaction effect is not significant. Since the interaction effect is not significant thus $p = 0.1843$, there is no moderation. The strength of moderation was also demonstrated by R2-chng as 0.0031 which is so negligible.

Table 4.11: Moderation Effect of IS on SCL and SCI

Dependent Variable: SCI

Model Summary						
R	R-sq	MSE	F	df1	df2	p
.5241	.2747	12.6217	51.8840	3.0000	411.0000	.0000
Model	coeff	se	t	p	LLCI	ULCI

constant	3.6739	3.6477	1.0072	.3144	-3.4966	10.8445 SCL
.5272	.1204	4.3797	.0000	.2906	.7638	
IS	.4693	.1823	2.5737	.0104	.1108	.8277 Int_1
-.0075	.0057	-1.3299	.1843	-.0187	.0036	

Product terms key:

Int_1 : SCL x IS

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0031	1.7685	1.0000	411.0000	.1843

Note: IK = Interdependent of knowledge, SCI = Supply chain innovation, IS = Information sharing, SCPI = Supply chain partnership insight, SCL = Supply chain collaboration level

4.7.3 Supply Chain Partnership, Information Sharing and Supply Chain Innovation

As indicated previously, the influence of an independent variable X on a dependent variable Y is moderated by the variable M, according to Hayes (2017, 208), if its magnitude, sign, or strength depends on or may be anticipated by M. In that situation, M is referred to as a moderator of X's effect on Y or as an interaction between X and M in influencing Y. The condition that should be met before moderation is that, the interaction effect must be statistically significant. Since the interaction effect is not significant thus $p = 0.3099$, there is no moderation. The strength of moderation was also demonstrated by R2-chng as 0.0019 which is so negligible.

Table 4.12: Moderation Effect of IS on SCPI and SCI

Dependent Variable: SCI

Model Summary

	R	R-sq	MSE	F	df1	df2	p	
	.4995	.2495	13.2699	44.9832	3.0000	406.0000	.0000	Model
	coeff	se	t	p	LLCI	ULCI		
constant	3.7844	4.4663	.8473	.3973	-4.9955	12.5644		SCPI
.4136	.1120	3.6914	.0003	.1933	.6338			
IS	.4167	.2204	1.8910	.0593	-.0165	.8500		
Int_1	-.0053	.0052	-1.0168	.3099	-.0156	.0050		

Int_1 : SCPI x IS

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0019	1.0339	1.0000	406.0000	.3099

Note: IK = Interdependent of knowledge, SCI = Supply chain innovation, IS = Information sharing, SCPI = Supply chain partnership insight, SCL = Supply chain collaboration level

4.8 Test for Hypotheses

It was necessary for the study to test the hypotheses after the analysis have been done. It was evidenced that four hypotheses were accepted while four were also rejected. Table 4.12 below shows the hypotheses, the various paths, their coefficient values, t-values, p-value and the decision on each.

Table 4.13: Hypotheses Table Hypotheses Path Coefficient T-Values P = Values Decision

H1a+	IK → SCI	.315	10.206	.000	Supported
H1b+	SCL → SCI	.338	7.339	.000	Supported
H1c+	SCPI → SCI	.252	4.235	.000	Supported
H2+	IK → SCL	.002	1.454	.180	Rejected
H3+	SCPI → SCI	.444	12.483	.000	Supported
H4a+	Moderation effect of →	.0005	1.0731	.284	Rejected

	IS on IK	SCI				
H4b+	Moderation effect of		-.0053	-1.0168	.309	Rejected
	IS on SCPI	IS				
H4c+	Moderation effect of		-.0075	-1.3299	.184	Rejected
	IS on SCL	SCI				

Note: IK = Interdependent of knowledge, SCI = Supply chain innovation, IS = Information sharing, SCPI = Supply chain partnership insight, SCL = Supply chain collaboration level

4.9 Discussion of Results

The objective of this study was to examine the relationship between supply chain collaboration and supply chain innovation. The study further tried to measure the extent to which information sharing can strengthen or weaken the link between supply chain collaboration and supply chain innovation. Empirical literature relating to the study was review in order to establish the gaps so that the current study can contribute towards that gap. Quantitative approach and descriptive survey approach were employed for this study because of its appropriateness in collecting and analyzing data to meet the research objectives. SPSS and Hayes Process model were the statistical tools that were employed to analyze the data. Below are the findings of the study.

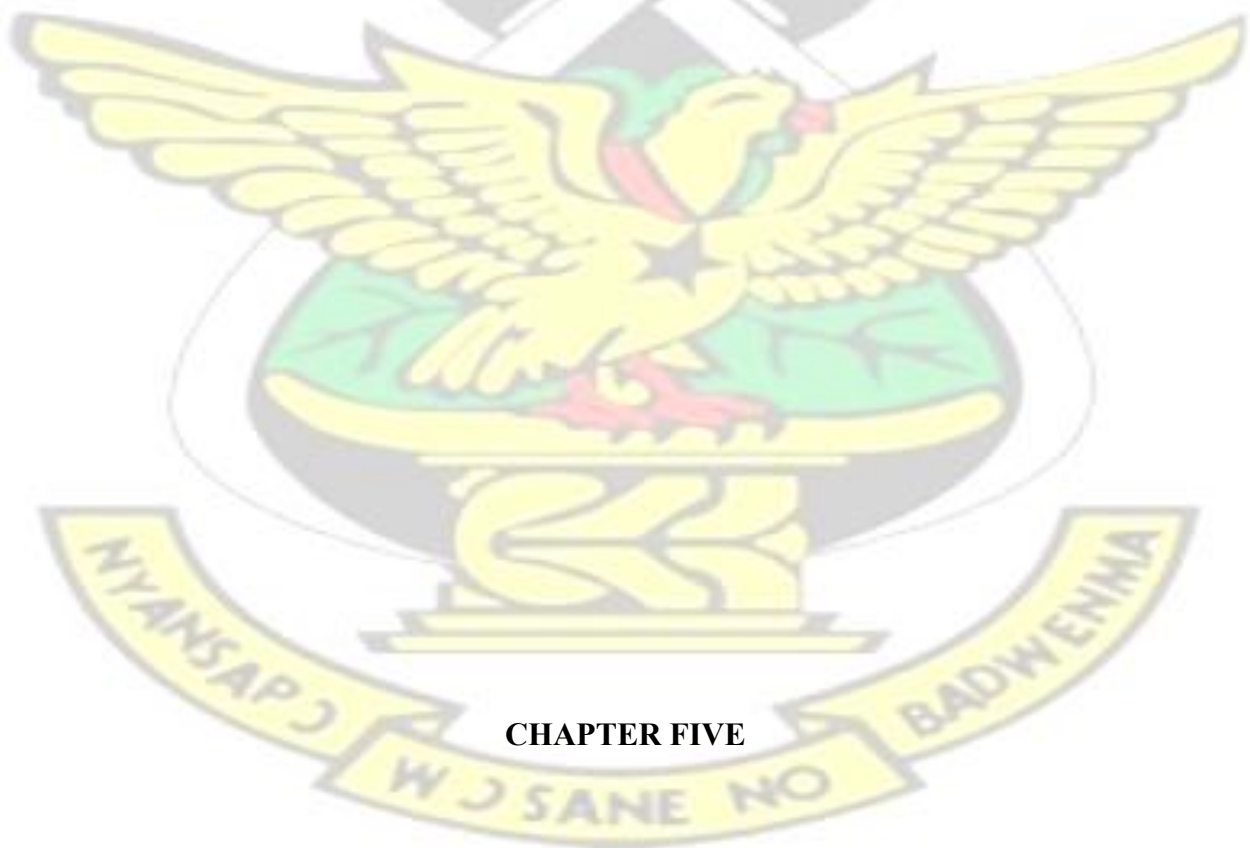
The study found that all the dimensions of supply chain collaboration (interdependence on knowledge, supply chain collaboration level and supply chain partner insight) have a positive and significant relationship with supply chain innovation). An effective connection among supply chain partners can help facilitate a combination of the resources owned by the firms. Resource combination leads to better results than those achieved by a single firm acting alone (Halldorsson et al., 2007). The literature supports that collaboration has links to innovations in the supply chain (Soosay et al., 2008). Collaboration is necessary for activities that promote innovation, such as cooperative product development and design for manufacturing though it is not an easy process

(Yuen and Thai, 2017). The findings are empirically supported by Simatupang and Sridharan (2005) who showed that supply chain participants with higher degrees of collaborative practices had better operational performance and innovative activities. Similarly, Zacharia, Nix and Lusch (2009) and Lapide (1999), also attested to the fact that supply chain collaboration boost innovation. The findings therefore support the H1a-c.

The study also found that interdependent on knowledge does not have a positive and significant link with supply chain collaboration level. This finding is contrary to Zacharia, Nix and Lusch (2009) who found a positive link between interdependent of knowledge and supply chain collaboration level. This could be as a result of lack of trust among firms. As a result of that, they are not willing to learn from each other expertise. Owing to that, there would not be collaboration because these firms do not have healthy competition among them hence the unwillingness to learn from one another that could lead to collaboration in the supply chain. The findings did not support H2+ which states that there is a positive and significant relationship between interdependent of supply chain knowledge and supply chain collaboration level.

There was a positive and significant relationship between supply chain partnership and supply chain collaboration. The results suggest that, good partnership among parties in the supply chain would lead to supply chain collaboration. This is because firms would not be willing to collaborate if they are not partners. When they are partners, they would be willing to pull their resources together for mutual benefits. The findings are empirically supported by Zacharia, Nix and Lusch (2009). The findings also support H3+ which states that there is a positive and significant link with supply chain collaboration level.

Lastly, the study tested the moderation role of information sharing on the relationship between supply chain collaboration and supply chain innovation. Surprisingly, information sharing did not moderate this relationship. The argument may be that, in situation where there is information overload, supply chain partners may not be able to utilize the available information for their mutual benefits. It even becomes difficult to retrieve vital information if too much information is at your disposal. This could lead to inability of supply chain members to respond to swift information hence affecting their innovation capability. Information overload could also lead to distorted information, irrelevant information and untimely information which could not have any impact on firms' operations. The findings are contrary to Zacharia, Nix and Lusch (2009) which could be as a result of differences in socio-economic characteristics of respondents.



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This is the last chapter of the study which presents a summary of the findings according to their objectives. It also includes conclusion of the study, recommendation for both managerial implication and for future studies.

5.2 Summary of Findings

5.2.1 Supply Chain Collaboration and Supply Chain Innovation

The first objective of the study is to test the link between supply chain collaboration and supply chain innovation. Supply chain collaboration was measured as a multi-dimensional construct namely; interdependent on supply chain knowledge, supply chain collaboration level and supply chain partnership insight. The findings revealed that, all the three dimensions of supply chain collaboration have a positive and significant link with supply chain innovation.

5.2.2 Interdependent on Supply Chain Knowledge and Supply Chain Collaboration Level

Another objective of the study was to test the relationship between interdependent on supply chain knowledge and supply chain innovation. The study revealed that there is no positive link between interdependent on supply chain knowledge and supply chain collaboration. This means that interdependent on supply chain knowledge does not have any association with supply chain innovation.

5.2.3 Supply Collaboration Level and Supply Chain Innovation

The study also sought to determine the link between supply chain collaboration and supply chain innovation. The findings show that there is a positive and significant link between supply chain collaboration level and supply chain innovation. This means that supply chain collaboration level to some extent, could influence supply chain innovation.

5.2.4 Supply Chain Collaboration, Information Sharing and Supply Chain Innovation

The last objective of the study was to test the moderation role of information sharing on the relationship between supply chain collaboration and supply chain innovation. All the three dimensions of supply chain were tested against information sharing as a moderator and supply chain innovation as a dependent variable. The findings revealed that information sharing did not moderate the relationship between information sharing and any of the three dimensions of supply chain collaboration (interdependent on supply chain knowledge, supply chain collaboration level and supply chain partnership insight).

5.3 Conclusion

The objective of the study was to test the moderation role of information sharing in the relationship between supply chain collaboration and supply chain innovation. The study reviewed empirical studies to establish gaps in which the current study can fill. Survey data, descriptive research design and quantitative approach were used. Convenience and purposive sampling techniques were used to gather data from the relevant respondents. SPSS and Hayes Process Model were used to analyze the data. The findings revealed that interdependent of supply chain knowledge, supply chain collaboration and supply chain partnership insight have positive and significant link with supply chain innovation. The findings also revealed that supply chain partnership insight has a positive and significant link with supply chain innovation. However, there is no positive and significant link between interdependent of knowledge and supply chain collaboration level. It was further revealed in the study that information sharing does not moderates the relationship between supply chain collaboration (interdependent of knowledge, supply chain collaboration level and supply chain partnership insight) and supply chain innovation.

5.4 Recommendations for Managerial Implications

Since the study revealed a positive link between supply chain collaboration and supply chain innovation, it is therefore important that partners in the supply chain should strengthen the relationship among them. There should be some kind of trust among supply chain members which would go a long way to improve supply chain innovation.

Also, as a result of the positive link between supply chain partnership and supply chain collaboration level, it is necessary that some kind of partnership should be encouraged in the supply chain. Members should take partnership ventures which could lead to good relationship and bonds that would bind them together to build collaboration level in the supply chain and interdepends on supply chain knowledge.

According to the study, information sharing does not moderate the relationship between supply chain collaboration and supply chain innovation. As a result, partners in the supply chain should share information but up to some limit. Too much information would lead to information overload which would affect the quality and relevant of the information and hence affect innovation among supply chain partners.

5.5 Recommendation for Policy

It is recommended that policy makers should establish innovation hubs to help SME innovate in their processes and products which would go a long way to improve the performance of the firms thereby propelling jobs creation and economic development

It is also recommended that policy makers should improve upon the internet coverage to include firms that are in the countryside. This would improve their network accessibility and enable them

to be able to connect with their counterparts leading to relationships building and collaboration to achieve a common goal which has a positive ripple effect on the economic.

It is also recommended that policy makers should improve on cyber security if they really want firms in the supply chain to share information. When cyber security is high devoid of cyber threats, firms would be willing to share even their confidential

information with their counterparts which could inure to increase productivity and firm performance.

5.6 Recommendation for Future Studies

Future studies can consider a comparative study to determine which industry has collaboration in supply chain innovation so that they can be used as benchmark for others to emulate.

Since the study used survey which has its own limitations, it is recommended that future study should consider experimental research design.

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KNUST

APPENDICES



KNUST School of Business
COLLEGE OF HUMANITIES AND SOCIAL SCIENCES
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI
University Post Office, Kumasi-Ghana West Africa

This research is to **Examining the relationship between supply chain collaboration on innovation: the moderating role of information sharing** which forms part of my Masters programme requirement at KNUST. Thus, this questionnaire is for academic purposes.

I would therefore be most grateful if you would assist me in responding to this questionnaire to enable me meet the objectives of my research. Any information given will be treated as confidential.

In filling out this questionnaire, kindly read each item carefully and make sure you understand it.

Indicate in one of the boxes by ticking [✓] or circle 'O' the numbers where applicable; Strongly Agree (7), Agree (6), somewhat Agree (5), Neither Agree or Disagree (4), Somewhat Disagree (3), Disagree (2) and Strongly Disagree (1) to show how relevant the item applies to you. Please respond to the following.

SECTION A

This section collects profile information about you and your company.

>>Gender (a) Male [], (b) Female []

>>Age (a) 18-25[], (b) 26-35[], (c) 36-45[], (d) 46-55[], (e) 56 or more[]

>>Level of education (a) HND [] (b) Professional Certificate [] (c) Bachelor's Degree [] (d) Postgraduate [] (e) PhD

>> What is your position in the organization?

(a) lower level management [] (b) middle level management [] (c) Top level management []

>>How long have you been working in this organization?

(a) Less than 1 year [], (b) 2 to 4 years [], (c) above 5 to 8 years [], (d) 9 to 10 years [], (e) More than 10 years []

>>How many years (approximately) has your company been in existence/ operation?

_____ years

>> How many people has your company employed on a full-time basis?

>> Does your company have a dedicated supply chain management department/unit? ☐ Yes
☐ No

SECTION B

<i>To what extent do you disagree or agree with the following statements on supply chain innovation?</i>	<i>Strongly disagree</i>							<i>Strongly agree</i>
Our firm offers new combinations of products	1	2	3	4	5	6	7	
Our firm offers an innovative customized products	1		3	4	5	6		7
Our firm consistently introduces new product items.	1	2	3		4	5	6	7
Our firm offers new flavors.	1	2	3		4	5	6	7
Our firm offers innovative presentation of products.	1	2	3		4	5	6	7

<i>To what extent do you disagree or agree with the following statements on interdependence of knowledge</i>	<i>Strongly disagree</i>						<i>Strongly Agree</i>
Our relationship with our suppliers and our customers requires that we are dependent on each other for effective solution	1	2	3	4	5	6	7
Our relationship with our suppliers and our customers requires that the needed knowledge are the other possessed.	1	2	3	4	5	6	7
Our relationship with our suppliers and our customers requires that the needed skilled are the other possessed	1	2	3	4	5	6	7
Our relationship with our suppliers and our customers requires that we need each other to reach their goals	1	2	3	4	5	6	7

<i>To what extent do you disagree or agree with the following statements on Supply Chain partner insight</i>	<i>Strongly disagree</i>						<i>Strongly Agree</i>
Our organisation has an appreciable knowledge about our partners skills and capabilities	1	2	3	4	5	6	7
Our organisation has an appreciable knowledge about our partners business model	1	2	3	4	5	6	7
Our organisation has an appreciable knowledge about our partners business risks	1	2	3	4	5	6	7
Our organization has an appreciable knowledge about our partners products	1	2	3	4	5	6	7
Our organization has an appreciable knowledge about our partners' processes.	1	2	3	4	5	6	7
Our organization has an appreciable knowledge about our partners' business objectives.	1	2	3	4	5	6	7
Our organization has an appreciable knowledge about our partners' communication style.	1	2	3	4	5	6	7
Our organization has an appreciable knowledge about our partners' industry jargon.	1	2	3	4	5	6	7
Our organization has an appreciable knowledge about our partners' organizational culture.	1	2	3	4	5	6	7

<i>To what extent do you disagree or agree with the following statements on collaboration level</i>	<i>Strongly disagree</i>							<i>Strongly Agree</i>
Our relationship with our suppliers and our customers requires that we use intensive collaborative planning.	1	2	3	4	5	6	7	
Our relationship with our suppliers and our customers requires that we make joint decisions on most issues	1	2	3	4	5	6	7	
Our relationship with our suppliers and our customers requires that we jointly set goals for the collaboration effort.	1	2	3	4	5	6	7	
There is free useful ideas for organizations involved throughout the collaboration.	1	2	3	4	5	6	7	
There is openness to discover new knowledge for organizations involved throughout the collaboration.	1	2	3	4	5	6	7	
There is openness in ways to improve joint performance for organizations involve throughout the collaboration.	1	2	3	4	5	6	7	

<i>To what extent do you disagree or agree with the following statements on information sharing</i>	<i>Strongly disagree</i>							<i>Strongly Agree</i>
Details of information are clearly explained	1	2	3	4	5	6	7	
The required information is appropriately given	1	2	3	4	5	6	7	
The necessary information is given so everyone could perform his or her duties.	1	2	3	4	5	6	7	
All service-related questions are adequately answered	1	2	3	4	5	6	7	

Thank you for participating in this survey