

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,  
KUMASI**

**PROCESS AND SUPPLIER CAPABILITY, COLLABORATION IN NEW  
PRODUCT DEVELOPMENT AND COMPETITIVE ADVANTAGE: THE  
MODERATING EFFECT OF RESEARCH AND DEVELOPMENT  
CAPABILITY**

**BY**

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**(BSC. LOGISTICS AND SUPPLY CHAIN MANAGEMENT)**

**A Thesis Submitted to the Department of Supply Chain and Information  
Systems, Kwame Nkrumah University of Science and Technology, Kumasi in  
partial fulfilment of the requirement of the award of a degree of**

**MASTER OF PHILOSOPHY LOGISTICS AND SUPPLY CHAIN  
MANAGEMENT**

**SEPTEMBER, 2023**

## DECLARATION

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

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## DEDICATION

I dedicate this work to my loving wife and the entire family for their prayers and support.

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## ACKNOWLEDGEMENTS

All thanks and praises to the almighty God for his love, protection and guidance throughout this program.

I wish to express my profound gratitude to my supervisor Dr. John Frimpong Manso who gave me invaluable advice, guidance and also made constructive suggestions both in substance and style to help me complete this study.

My special thanks and appreciation goes to Mr. Ofori Issah and Madam Emmanuelle for their immense support, advice and encouragement.

Most importantly, I would like to express my sincere appreciation to my Wife, Mrs Anastasia Adarkwa and my Sister Dr. (Mrs) Vivian Paintsil for their understanding, support, encouragement, prayers and advice throughout the course of my studies.

Finally, to all my friends I say thank you for the various roles you have played in my life.



## ABSTRACT

New product development plays a pivotal role in driving progress and gaining a competitive advantage for every country. The ever-evolving production technology and service landscape are impacting businesses worldwide. With product life cycles becoming increasingly shorter, the importance of effective new product development cannot be overstated. Small and medium-scale enterprises (SMEs) and larger firms cannot rely solely on traditional methods like cost reduction to enhance competitiveness. Instead, a consistent approach and the development of fresh ideas are crucial for successful operations in today's market. This study aims to examine the influence of process and supplier capabilities, collaboration in new product development, and the moderating role of research and development capabilities on competitive advantage. An explanatory research design was employed, relying solely on quantitative methods and primary data sources. Convenience and purposive sampling techniques were used to select the study's respondents, resulting in a sample size of 250. The findings reveal that process capabilities have a positive and significant impact on collaboration in new product development. Similarly, supplier capabilities demonstrate a positive and significant influence on collaboration in new product development. Furthermore, collaboration in new product development is found to have a positive and significant effect on competitive advantage. The study also highlights the positive and significant moderating role of research and development capabilities in the relationship between collaboration in new product development and competitive advantage. Based on these findings, the study recommends that organizations provide periodic training and development opportunities for their staff to enhance task execution and achieve a competitive advantage. Additionally, establishing a dedicated research and development unit is crucial for identifying the most appropriate approaches in carrying out organizational activities. Finally, the management of organizations in Ghana should be willing to adapt their designs to meet customer demands and maintain competitiveness.



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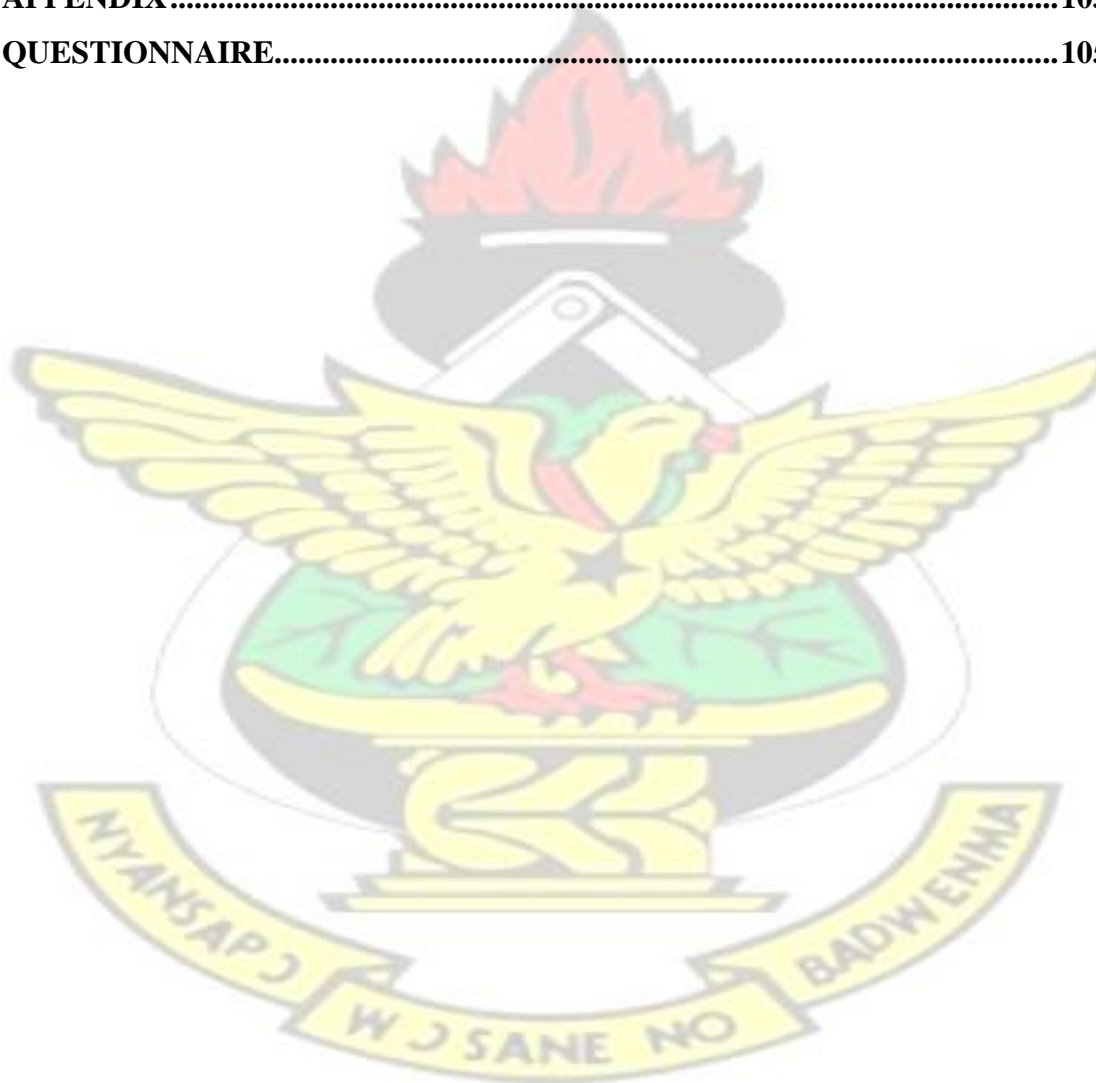
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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

The global economy has shifted as a result of technical, regulatory, and economic considerations which stem from industrial revolutions. Systems have often struggled to adequately deal with such rapid changes, especially when it comes to dealing with rapid growth and the need to transfer (Etemad et al., 2018) over the next few years, these trends will exert considerable pressure on the global economy, posing a serious challenge for unprepared systems. The only way to deal with the current challenges and prepare for the upcoming industrial revolutions is to invest in research and development (R&D). Yet, there is certainly less priority on implementing R&D as a significant tool within developing economics (Wang et al., 2013). Large firms especially the automotive industries are now enjoying growth due to the investment in R&D as a capability to come out with new ideas and also collaborating with other actors along the supply chain to product new product.

In order to acquire access to a supplier's technology, companies partner with them on new product development (NPD). It is critical for many companies, particularly major system integrators who use many technologies, to incorporate new technology into their products with the help of involving suppliers at the early stage of the product development (Takeishi, 2021). Most companies in the developed countries especially the automotive industry is an example of an industry that has worked with major suppliers on product development for many years (Womack et al., 2017; Lamming, 2013; Liker et al., 2016). The development of the air conditioning system is one example of supplier engagement that has been researched in the car industry (Zirpoli and Camuffo, 2019). The automobile industry has been able to make better use of their suppliers' knowledge and expertise by incorporating them in product development. Technical knowledge as a result, reduced costs, higher quality, and faster innovation are now possible (Ro et al., 2018). Other industries benefit from involving suppliers in NPD since it is critical to get new competitive products to market quickly, as development durations are said to be shortening (Eisenhardt and Tabrizi, 2015). Supplier involvement in New Product Development will grow in industries including Small and Medium-sized Enterprises, other than the automobile industry, according to



Wagner and Hoegl (2006), The authors give numerous explanations for the increased involvement of suppliers in New Product Development. First, a reduction in the firm's Research and Development resources; second, a desire to obtain supplier knowledge; and third, a goal to achieve a faster time to market and lower New Product Development costs. However, numerous companies within the developing countries are still confronting various technological obstacles due to decelerating advancements towards their ideas creation (Adam, 2016; Beata, 2017).

Furthermore, new product development is one of the most important components for each country's progress and competitive advantage. Changes in production technology and service organization are affecting businesses all around the world. Because the product life cycle has never been shorter than it is now, one of the most critical business jobs is new product development. It is impossible for small and medium scale Enterprises (SMEs) or other larger firms to stay on the market using solely traditional ways of enhancing competitiveness, such as cost reduction. Only a consistent approach and the development of fresh ideas can assist a firm in operating successfully. New product or service creation is critical for economic growth and welfare development in every economy.

For many SMEs (small and medium-sized enterprises) and their clients, developing supplier capacity has become increasingly vital. Large firms are increasingly using external specialists and outsourcing different portions of their manufacturing and support services to contract manufacturers as a backdrop to this change (Henrekson and Stenkula, 2006; Huin et al., 2002; Kim et al., 2017). Parallel to this, many customers seek a small number of system suppliers or partners who can play a larger and more complex role in the supply chain, as well as complement and support the customer's manufacturing and product development processes (Gadde and Snehota, 2000; Handfield et al., 1999; Helander and Möller, 2008; Maloni and Benton, 1997).

According to the resource-based view (RBV), when a firm lacks the resources or capabilities needed to maintain a competitive advantage, those resources or capabilities can be obtained through interfirm collaboration or strategic alliances (Gulati et al., 2020), that impact a firm's performance and competitive advantage (Chen and Paulraj, 2019; Dyer and Singh, 2018). Toyota, for example, makes use of suppliers' resources by establishing a comprehensive knowledge-sharing network (Dyer and Nobeoka, 2020). Coca-Cola also has a partnership with Nestle, which has aided in the



development of Nescafe vending machines (Hamel and Prahalad, 2014). Collaboration between small and medium-sized businesses and their suppliers also benefits their competitive edge (Takeishi, 2011), particularly in the new product development process (e.g., Clark and Fujimoto, 1991).

Many businesses must engage with their suppliers to achieve technical innovation as market rivalry intensifies. Using supplier experience and component and part information can help companies build a broad knowledge-sharing network, improve product design (Hong et al., 2004; Oh and Kim, 2015), or develop innovative ways for generating higher-quality products (Hong et al., 2014; Tsai, 2019). Involvement of suppliers may also help organizations quickly discover potential technological issues that impede design revisions or enable concurrent engineering (Hilletofth and Eriksson, 2011). Firms can also benchmark best practices/processes with suppliers, improving their capacity to respond to consumer demands and wishes. Overall, including suppliers can help speed up the creation of new products and save costs. Competitive advantage (Lau, 2011; Oh and Rhea, 2010).

## **1.2 Statement of the Problem**

Competitive advantage is a systemic outcome that develops as firms and constituents participate in processes that entail not only the use and exchange of resources but also communication about and interpretations of those exchanges. For large enterprises, industry competitiveness is a catalyst for the development of capabilities, focusing on building long-term strategic advantages. Firms need to create an effective business model to acquire competitive advantage and superior financial performance. Small and Medium Enterprises (SMEs) play a crucial role in many economies, but they often face challenges in achieving competitive advantage in the marketplace. While SMEs have the advantage of flexibility and local market knowledge, they often struggle to achieve scale economies, especially when competing against larger chain stores. Larger firms often derive advantage through new product development and cost reduction, while SMEs are more concerned with satisfying customer needs. This difference in focus can sometimes hinder SMEs in achieving a broader competitive advantage. SMEs can achieve competitive advantage through partnership management and supply chain collaboration. Research shows that partnership selection, establishment, and sustention have a significantly positive influence on supply chain collaboration and innovation

performance (Hui et al., 2015). Collaboration among actors can lead to value innovation, enhancing new product development capability and this advantage is measured by process efficiency, offering flexible suppliers, business synergy and quality. Existing studies (Yi et al., 2021); Hosseini et al., 2018; Wahyono, 2019; Dorson, 2018) indicate that competitive advantage factors, including quality, efficiency, innovation, and accountability, were positively and significantly related to best-matched marketing and technological innovativeness of new product development, but the extent to which collaboration among actors in new product development has received less attention. This present study concentrates on the influence of collaborative new product development initiative on competitive advantage.

Again R&D capability is essential in achieving competitive advantage as it fosters innovation, enhances product design, facilitates collaboration, and synergizes with other organizational capabilities. In the context of new product design, R&D capability ensures that products are not only innovative but also aligned with market needs, ensuring a competitive edge in the market. Due to the weak R&D capabilities of SMEs, they tend to compensate for a lack of R&D by emphasizing internal and external interactive learning, at least to some extent as argued by (Thomä & Zimmermann, 2020). SMEs with strong R&D capabilities can enhance new product performance through customer involvement. It is evident that by understanding the dynamics of R&D and its impact on product innovation and market positioning, SMEs can better navigate the challenges of the marketplace and carve out a unique space for themselves. Previous studies such as (Homburg et al., 2017; Karbowski, 2019; Rodríguez, 2017; Aarstad & Kvitastein, 2020) focused on R&D in areas like sales cooperation, product innovation and marketing but this study intends to empirically contribute to existing studies by examining how SMEs in their collaborative new product development can achieve competitive advantage through R&D capabilities.

Adebanjo et al. (2018) found that supply chain relationships and integration relate positively to both product and process innovative capabilities, Yenyurt et al. (2014) showed that supplier involvement in buyer new product development is mutually beneficial for both the buyer and the supplier, increasing the performance of both parties. These two capabilities, process, and supplier capabilities, when combined through collaboration among actors can lead to competitive advantage. The identified

research gap lies in the absence of comprehensive research that addresses the nuanced dynamics of collaboration in NPD, process and supplier capabilities, and their combined influence on competitive advantage within Ghanaian SMEs. This study seeks to bridge this gap by conducting an in-depth investigation into these relationships, paying particular attention to the moderating role of Research and Development (R&D) capabilities.

### **1.3 Objectives of the Study**

The overall objective of the study is to investigate process and supplier capabilities on collaboration in new Product development and competitive advantage, with particular emphasis on the moderating effect of research and development capabilities. The specific objectives are;

1. To assess the influence of process capabilities on collaboration in new product development in small and medium scale enterprise
2. To examine the effect of supplier capabilities on collaboration in new product development
3. To determine the influence of collaboration in new product development on competitive advantage
4. To ascertain the moderating effect of Research and Development Capabilities on the relationship between collaboration in new product development and the competitive advantage

### **1.4 Research Questions**

1. What is the influence of Process Capabilities on Collaboration in New Product Development within Small and Medium-Scale Enterprises?
2. What is the effect of Supplier Capabilities on Collaboration in new Product Development?
3. What is the influence of Collaboration in new Product Development on Competitive Advantage?
4. What is the moderating effect of Research and Development Capabilities on the relationship between Collaboration in new Product Development and the Competitive Advantage?



### **1.5 Significant of the Study**

The research is embarked upon to provide insight on the influences of process and supplier capabilities, collaboration in new product development and competitive advantage and the moderating effect of research and development capabilities of the firms on the output of firms within the context of Ghana with empirical data to validate the practices of firms in relation to the concepts chosen. The study is set to corroborate the theoretical foundation on resource-based view and the dynamic capabilities theory with real data from the field of study so as to contribute meaningfully and scientifically to studies the influences of process and supplier capabilities and collaboration in new product development on competitive advantage and the moderating effect of research and development capabilities and its support to production entities operating in the country.

Again, the findings from this study provide the foundation for the growth of Small and Medium Scale Enterprises (SMEs) and the Ministry of Trade and Industries, the sector in charge of business entities in the country to refocus their attention on the role played by suppliers and other related firms involves in re-engineer new product development activities to improved firm capabilities. Programs and policies tailored on the SMEs would therefore help them to tailor the resources at their disposal to incorporate support of their customers both internal and external and to help the firm to achieve competitive advantage.

This study builds to the literature by examining the span of process and supplier capabilities, collaboration in new product development, and competitive advantage and implications of moderating effect of research and development capabilities. It provides important insights into what it means to be more collaborated, and highlights the need for firms to engage the supplier involvement and collaboration broadly. The results also highlight opportunities for further exploration of the concept of early supplier involvement in product development. While they demonstrate the positive impact of a broad span on competitive advantage, the results provide specific cues as to what explains these differences.

Due to the little study that have emphatically studied the chosen concepts in a unified study, the findings from the study would also serve as a foundation and a breakthrough for future researchers, academicians and practitioners who might endeavor to examine

the combination of the concepts in a unified study or any of the topics as unit study on the supplier development on performance in SMEs in Ghana or across West Africa.

### **1.6 Overview of Methodology**

The methodology for the study is about the techniques that have been adopted to assist collect useful and relevant data in the examination of the findings. This study was an explanatory form of study that focused on the influences of process and supplier capabilities on collaboration in new product development and competitive advantage and effect of research and development acting as a moderator. Based on this, the study utilized the quantitative methodology with closed-ended questionnaire as the data collection instrument to obtain relevant information for the analysis. The researcher considered that the method would help to analyze the relationship or otherwise within the selected variables. The purposeful and convenient sampling techniques were employed to select relevant respondents for the study. This method was used as it was considered to help target eligible respondents to contribute to the study. The data collected from employees of small and medium scale Enterprises within the Western Region of Ghana. In order to analyze the relationships and the moderating impact of the selected variables, the researcher used the SPSS' Pearson correlation and a multiple hierarchical regression in the analysis of the data gathered

### **1.7 Scope of the Study**

Geographically, the study focused on Small and Medium Enterprises in the Western Region of Ghana. The scope of the study is a survey on Small and Medium Scale Enterprises (SMEs) in the Western Region of the Republic of Ghana. The study however particularly is geared towards assessing the influences of process and supplier capabilities and collaboration in new product development on competitive advantage: Moderating effect of research and development capabilities in SMEs within the Western Region of Ghana. The researcher adopted firms within the Western Region of Ghana because of its natural resources and the firms are involved in series of supplier partnership, and are perceived to possess varied forms of resources and capabilities in addition to being surrounded by various forms of competitors in their business operations. The construct Supplier Capability, Collaboration in New Product



Development, Competitive Advantage, Process Capabilities and Research and Development Capabilities were all measured as first order construct.

### **1.8 Limitations of the Study**

The study was hindered by the COVID 19 pandemics, as the researcher could not travel freely to obtain the necessary data at the appropriate time. The study was also restricted by time and finances that prevented the researcher in completing the study promptly as the conduct of the study was carried out in relation to other essential tasks. It must, however, be emphasized that all was done to ensure that the restriction did not undermine the results of the study

### **1.9 Organization of the Thesis**

This study is divided into five chapters: Chapter One comprises the following; Background to the study, Statement of the Problem, Objectives of the study, Research questions, Significance of the study, overview of the research methodology, Scope of the study and Organization of the study. Chapter Two comprises of Conceptual review, theoretical review, empirical review and conceptual framework. Chapter Three was on the research methodology used to collect essential data to examine the variables while Chapter Four dealt with data presentation, analysis and discussion of results. Chapter Five presents the Summary of findings, conclusions, theoretical and managerial implication as well as the recommendations of the study

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Chapter two of this study focused on the review of existing studies on the influence of process and supplier capabilities (SC), Collaboration in New Product Development (CNPd) on Competitive Advantage (CA); Moderating role of Research and Development Capabilities, Process Capabilities (PC), Research and Development Capabilities(R&DC) and the relationship between supplier capabilities and competitive advantage. The chapter begins with summarized definitions on Supplier, followed by Supplier Capabilities (SC), Process Capabilities (PC) Collaboration in new product development (CNPd), and then New Product Development (NPD). The chapter also discussed the theoretical foundation underpinning this work as well as the empirical review and conceptual framework of the study.

#### **2.2.1 Firm Capabilities**

Capabilities are a critical success factor for the collaboration strategy as they represent both the value the firm can contribute to the collaborative relationships and the cost to manage them. Firm capabilities are organizational processes that integrate, build, and reconfigure the resource base to match changes in the marketplace, enable organizational learning, and help shape the environment to the firm's advantage (Eisenhardt and Martin, 2010). Static resources are transformed into capabilities to create a competitive advantage and realize superior financial performance. The existing capabilities of the firm are the basis on which the firm develops and strengthens its competencies through continuous, collaborative learning. The capabilities of the firm are its chief component for competitive advantage (Ketchen and Wright, 2011).

A Firm's capability enables it to distinguish between transactional and collaborative relationships and manage them accordingly with differential governance mechanisms, thus safeguarding against potential opportunism and other risks (Faems et al., 2018). The more a firm can integrate with its diligent supply chain partners, and also protect its investment including its intellectual property, the more willing and motivated it is to partner with others, and the more it can profit from the integration (Faems et al., 2015). Also, the capability of the firm helps to collect and transfer codified information and

sharing of tacit knowledge embedded within organizations through building relational governance and informal communication channels. Thus, a firm capability is a fundamental element for the success and improvement of any form of Supplier Capabilities in the business environment (Faems et al., 2018).

The studies on supplier capabilities generally fall into three broad categories namely innovation, information, and relational capabilities that contribute to product design, new product development, and business process innovation. Innovation capability refers to the organizational processes to perform innovative activities related to offerings, operations, management, and marketing to create superior customer value (Terziovski, 2007; Camison and Villar-Lopez, 2014). Integrating cultural, intellectual, technological, structural, and other resources, and innovation capability enhance the firm's absorptive capacity to acquire, assimilate, transform, and exploit external resources for greater market performance (Zahra and George, 2002; Hulland et al., 2007; Mithas et al., 2011; Lisboa et al., 2011).

The Information capability on the other focused on the management of information, typically enabled by deploying cutting edge information technology to enhance communication, the collection, analysis, and dissemination of market information, and coordination within the firm and among business partners (Katayoun et al., 2017; Nakata et al., 2011). That is, the firm's processes to employ technology to acquire, process, and transmit information to support decision-making, improve business operations, and facilitate communication and coordination with external partners. Since information is the bedrock of communication and coordination, firms rely on advanced information technology to collect information, identify market opportunities, communicate with external partners, and streamline business processes (Hulland et al., 2007; Nakata et al., 2011).

The relational capability also focused on the firm's processes to develop and manage its network of relationships with external partners for greater value creation. It reflects the firm's ability to identify best partners, initiate and develop relationships (Morgan et al., 2009) and design governance mechanisms for effective collaboration. It entails developing, nurturing, and managing external relationships (Faems et al., 2018).

These three categories of capabilities broadly capture the major cross-functional business processes related to inter-firm integration including new product development, operations, inventory management, logistics, customer relationship management, and



supplier relationship management. The firm's capabilities therefore enable integration to promote innovation across multiple partner organizations, reduce counterproductive behaviour through frequent and open communication, and devise governance mechanisms for goal alignment and risk sharing. It also enables firm to both contribute to and benefit from external collaborations (Leischnig et al., 2014).

Furthermore, capability puts partners at ease as they are confident that relationship problems can be avoided, minimized, or resolved appropriately, and each partner will receive a fair share of the value created through collaboration. Thus, capability serves to attract potential partners and enables the firm to benefit from integration of the business activities (Fang et al., 2008).

### **2.2.2 Process Capability**

Capabilities for managing business processes have been studied from different angles, albeit mainly without measurement instruments. For instance, much of the literature considers the process lifecycle. While lifecycle variants exist (Weske, 2010; Dumas et al., 2018), they are initially derived from Deming's "plan-do-check/study-act" cycle (Deming, 2014). Since the PDCA acronym is also established in other management domains (e.g. change management and quality management), these four phases are generic for widespread acceptance and still able to categorize specific BPM methods and techniques such as modeling notations in the "plan" phase or Lean Six Sigma initiatives within the "act" phase (von Rosing et al., 2015). While some process lifecycles include managerial aspects (Weske, 2010), other studies clarify this holistic view in more detail. Such studies supplement the process lifecycle with process management and organizational characteristics, such as a process-oriented culture and structure, but, again, generally without measurement instruments (Danilova, 2018; Kratzer et al., 2018; Trkman, 2010; Brocke et al., 2014).

The capabilities for managing business processes have been used to propose MMs with measurement instruments. However, each MM uses its own set of capabilities and measurements (Röglinger et al., 2012). For instance, the model of de Bruin and Rosemann (2017) covers six capability areas, whereas the model of McCormack and Johnson (2011) is limited to three areas. Hammer (2017) takes another approach by measuring capability areas for both individual processes and the entire process

portfolio. While these sources provide insight into BPM dimensions, they also give rise to confusion (e.g. for benchmarking). The same is true for diverse measurement instruments used in studies dealing with process performance (Dijkman et al., 2015; Kohlbacher and Reijers, 2013; Bronzo et al., 2013). Another study relied on management-oriented theories to build a conceptual framework that was validated by comparing 69 process-centric MMs (Looy et al., 2014). The study identified capability areas and subareas based on a theoretical foundation but without operationalization. Alternatively, studies have focused on single capability areas or more narrow perspectives, e.g., organizational culture (Schmiedel et al., 2014; Grau and Moormann, 2014; Hribar and Mendling, 2014), job construal's (Kettenbohrer et al., 2016), process variety (Zelt, Recker et al., 2018) or process standardization (Wurm et al., 2018). Other scholars have examined individual characteristics, e.g., gender issues (Gorbacheva et al., 2016).

### **2.2.3 Supplier Capabilities**

When it comes to new product development, the value of supplier competencies has received less emphasis. Supplier capabilities are defined in this article as the ways in which suppliers interact with a buyer's operations by providing extensive input on the procurement of a product or service. Elements such as the functionality of the offered product/service, the characteristics of the service delivery process, and the fluency of the buyer-supplier engagement must all be considered in order to reap the benefits of supplier capabilities (Blut et al., 2015; Lee and Lin, 2005; Saunila et al., 2017). As a result, while the product and its technical basis are value enablers, the client base should be considered a development priority as well (Oliveira and Roth, 2012). This entails looking at the service process in terms of information sharing, promise fulfillment, and empathy (Saunila et al., 2017; Haque and Islam, 2018), as well as relationships in terms of trust development (Saunila et al., 2017; Haque and Islam, 2018; Corsten and Felde, 2005; Mitrega et al., 2017).

Understanding the buyer and their needs is a fundamental aspect of organizational marketing (Cabanelas et al., 2023) and maintaining critical supply relationships necessitates organizational learning centered on what consumers want and value (Day, 2000; Ulaga and Chacour, 2001). To develop customer value, a set of supplier skills based on customer needs is required (Pekka et al., 2011). Customers regard capabilities



as bundles of skills, information, and resources possessed by suppliers that are valuable to them and difficult to copy by competitors (Rajan, 2020; Day, 2014; Laura et al., 2015). Capabilities, in turn, are seen as a fundamental determinant of organizational performance (Teece et al., 2017) and the organization frequently 'buys' these talents. (Croom, 2012).

Therefore, supplier capabilities are important but before that the firm should also assess its capabilities in order to match their responsibilities.

**Table 2.1: Summarized Definitions on Supplier Capabilities**

<b>Author (s) year</b>	<b>Definition</b>
(Arun et al., 2016)	The ability of <b>suppliers</b> to meet the requirements of a lead firm or buying firm including specifications about quality, timely delivery and environmental and safety standards.
(Sarkar and Mohapatra, 2006)	Capability is defined as the supplier's potential that can be leveraged to the buyer's advantages in the long term.
(Saunila et al., 2021)	we consider <b>supplier capabilities</b> as the ways in which suppliers engage with a buyer's operations by offering extensive input with regard to the procurement of a product or service.
(Tan et al., 2020)	Supplier capability refers to the ability of suppliers to meet all transaction requirements.
(Meyer et al., 2017)	Supplier capability refers to an individual (or organization's) ability to view situations from a supply or business perspective, resulting in better business decisions and more innovative thinking

Source: Fieldwork, 2022

### **2.2.3.1 Supplier Integration**

The supplier integration also represents a situation where suppliers are involved in the key decision-making processes of the firm with information regarding demand forecasts, production and inventory levels being shared between them. It involves focal firms working in partnership with their key suppliers to maximize the benefits of the relationship such as improving the lead times, innovation, and quality (Thun, 2010). It occurs when a firm integrates with its suppliers to structure inter-organisational strategies, develop synchronized processes and share information and knowledge (Flynn et al., 2010). It has been considered to be a critical source of competitive advantage as it improves inter-enterprise operations (Wang et al., 2011). Supplier integration provides a unity of effort in meeting customer requirements for products and in responding to changes in markets (Min et al., 2018). Firms can acquire insights into suppliers' capabilities and constraints (Huo, 2012; Owais et al., 2020) ultimately enabling more effective planning and forecasting, better product and process designs and reduced transaction costs (Zhang and Huo, 2013).

### **2.2.4 Research and Development Capability**

A firm's Research and Development (R&D) can be seen as a series of organic systems to which input-process-output is connected. R&D resources are used as input resulting in improved performance through the process of transformation. It is important to invest in R&D to maximize R&D performance, it is also highly important to utilize input components through effective and efficient R&D processes (Lavie et al., 2010). Andriopoulos and Lewis (2009) define R&D capability as a firm's ability to develop and exploit technological know-how, or the application of scientific knowledge for commercial purposes, such as the development of new products or processes. R&D capabilities are most important for an organization's strategic market position. R&D capability is indicative of the organization's ability to conceptualize new product designs which can provide platforms for new markets. R&D capability in markets where a very small number of new ideas reach commercialization is typified by idea generation capability (Andriopoulos and Lewis, 2019).

Ambos and Schlegelmilch (2018) conceptualize firm's R&D capability as the firm's ability to integrate R&D strategy, project execution, project portfolio management,

R&D expenditure. , R&D capabilities can be largely divided into internal and external capabilities. Internal R&D capabilities means the resources of the firm are established to develop R&D internally. This can be evaluated in terms of R&D intensity, human resources (Ambos and Schlegelmilch, 2008). Dutta et al. (2013) argues that R&D capabilities in the new technology market are an essential component of a firm's optimal performance, and that R&D capabilities can be understood as the dynamic means of enhancing a firm's capabilities through knowledge creation and utilization, thereby maintaining or gaining a competitive advantage. R&D capability depends on the routines that help a firm develop new technical knowledge, combine it with existing technology, and design superior products and services.

An industry's R&D is a leading activity for technology innovation, as a result of which it can enjoy a monopolistic position in the market. Furthermore, technology innovation through R&D enables organizations to meet market or societal demands by introducing new product and process innovations and commercializing them through development (Utterback, 2017). It also helps differentiate products and gain cost-competitive advantage by enabling the development of new products and the use of new processes, and it becomes a primary source of securing competitive advantage (Tidd and Bessant, 2019). As a result, industry's R&D capability can be characterized as a dynamic capability that includes the development and application of knowledge to improve the industry's ability to retain its competitiveness. The result of R&D is a fraction of output that includes the input of human and material resources that have been invested in R&D activities, implying efficiency or effectiveness in producing outputs with economic resources such as human resources, facilities, capital, and time (Ranftl, 2018). Direct performance, which can be obtained directly through R&D efforts, and indirect performance, which can be obtained through technical performance, are two types of R&D outcomes. Direct performance includes patents, property rights, and technical fee income, whereas indirect performance includes, in a narrow sense, commercialization of R&D and cost reduction, and, in a broader sense, contributes to the revitalization of the national economy, enhancement of national competitiveness, and gaining industry dominance (Zahra and George, 2012).



### **2.2.5 Collaborative in New Product Development**

The rising complexity of internal and external linkages during new product development has emerged from market need for organizations to offer innovations while maintaining cost effectiveness. Collaborative product creation has grown in popularity in recent decades as a means of saving time and money (Leek et al., 2013). According to Cassidy (2014) the theoretical concept of collaborative new product development (CNPDP) as we know it first appeared in 1994. Collaboration in the context of product development, on the other hand, has been discussed much earlier, for example, by Hippel (1988) who advocates for "know-how trade" between enterprises. Authors such as Bruce, Leverick, and Little used the CNPD concept in many additional papers in 1995 (Bruce et al., 2015).

The complexity of collaborative product creation, and success criteria were all on the table at the time. Later (Yuan et al., 2020; Mohammad and Lisa, 2020) presented CNPD as a useful tool for saving development time and reducing organizational risk. The authors also emphasized that collaborative product creation is an evolving process, with the form and scope of its commencement and continuance changing over time. The Product Development Management Association (1996) defines collaborative product development as when two or more companies decide to collaborate in product development as mutual partners, and that it differs from outsourcing in terms of the level of partnership, because collaborative companies are linked in the process of delivering the final solution to the intended user.

This definition emphasizes the external nature of CPD. Collaborative product development, according to Del Rosario et al. (2013) the application of team collaboration strategies to an organization's product development initiatives. In addition, in a customer-focused environment, collaborative product creation includes concurrency, attention to the life cycle, suppliers, and information technology.

Collaborations are viewed as a way to acquire access to complementary technology and resources from network partners (Ferreira et al., 2015). Adler and Kwon (2012) proposed that the structure of network linkages influences the accumulation of social capital by enterprises, based on the structuralism perspective. According to studies, technological-based cooperation networks have a significant impact on organizations' technological innovation activities. Vanhaverbeke et al. (2012) argues that direct relationships, from both a competency and governance standpoint, are beneficial. The

establishment of core and noncore technology is influenced by indirect linkages and a non-redundant structure among a firm's ties. Direct linkages, indirect ties, and non-redundancy among relationships in a cooperation network, according to Guan and Liu (2016) can affect companies' exploratory and exploitative innovations in a variety of ways. Rojas et al. (2018) show that network cohesiveness and centrality both have a favorable effect on a firm's innovativeness in a collaboration network between firms and government sponsored institutions (GSIs).

Direct ties have an inverted U-shaped influence on innovation performance in the government-sponsored cooperation network, according to Liang and Liu (2018) while indirect ties have a positive effect on innovation performance. According to Kim (2019) a firm that is one of the primary components of an inter-firm network is more innovative performance.

Few researchers have looked on its direct impact on the NPD. As a result, a fascinating research question remains: how can a company leverage cooperation networks to produce new products? We can investigate the impact of collaborative network structure on new product development.

NPD is a type of innovation activity in which ideas or technologies are manifested, managed, new knowledge is developed and incorporated in the product, and the product is then launched to the market (Mu et al., 2009). The NPD is made up of a number of activities such as information processing, knowledge searching, and problem solving (Adams et al., 2018; Caner and Tyler, 2015; Frankort, 2016; Katila and Ahuja, 2002). According to organizational learning, the NPD needs the firm to obtain, share, and utilize market data (María et al., 2020). Knowledge search, which entails the study of new knowledge and the application of current knowledge in organizations to solve issues and generate new products, is also argued by organizational learning (Katila and Ahuja, 2002). In instance, a study of NPD innovation reveals that the acquisition of complementary knowledge. The requirement for knowledge and technical resources for innovation emerges as a primary motivator for inter-organizational collaboration (Becker and Dietz, 2004; Faems et al., 2015). Network researchers, on the other hand, believe that assimilating external knowledge via interfirm networks is more advantageous to a company's NPD operations (Simon and Tellier, 2011; Soh, 2013).

In this thesis, the term "collaborative product development" refers not only to external collaboration between two or more companies, but also to internal collaborative



components such as function integration. The collaborative product development setting is a product development initiative that involves both internal and external cooperation.

#### **2.2.5.1 Stakeholders Support**

Stakeholders are persons or groups that have, or claim, ownership, rights, or interests in a firm and its activities, past, present, or future. They are entities who help in decision making, have direct responsibility and are also the intended beneficiaries. That is, groups of direct service staff, policy makers, funders, advisory boards, program developers, administrators in the organization implementing the decisions, managers, families, communities, journalists, taxpayers, and members of the general public. Stakeholders could be internal and external. The internal stakeholders have a more direct relationship with the company, typically being members of staff and managers. The external stakeholders usually include creditors and suppliers, but it also includes larger groups such as trade unions, government regulators, and community groups (Jolanta, 2015). An efficient approach to identify stakeholders, clarify their interests, assess their power and its sources, and determining how they might best be engaged in the design and implementation of the progress and development of a firm is essential to the survival of a particular institution (Ackermann and Eden, 2011).

Stakeholder support implied the power of people or small groups to respond to, negotiate with, and change the strategic future of a firm. The support provided by the stakeholders assist the firm to fulfill their own goals and on whom, in turn, the organization also depends. The support provided to the firm from its stakeholders help it growths, resources and outputs in a competitive business environment (Johnson and Scholes, 2012). Accordingly, stakeholders support promotes dynamic capabilities in the success of the firm.

Support from stakeholders to an organization basically falls into primary and secondary. The primary stakeholder support group is one without whose continuing participation the firm cannot survive on the business environment and comprises shareholders, employees, customers and suppliers. It also involved the governments and communities that provide infrastructures and markets, whose laws and regulations must be obeyed, and to whom taxes and other obligations may be due. Failure to retain

the support of this group of stakeholders will likely result in the failure of the firm (Harrison and Wicks, 2013), some of the support from this group of stakeholders is discussed below:

#### **2.2.5.1.1 Customers**

This group provide support in the form of promotion of learning and innovation capabilities. For example, research suggests that companies are able to learn how to create increased brand meaning in the process of managing consumer experiences (Iglesias et al., 2013; Payne et al., 2009). In addition, customer involvement in the product development process enhances the firm's innovation skills (Ramaswami et al., 2019). By managing and implementing customer co-creation and interaction activities, a firm can enhance its learning and innovation skills, as well as develop the ability to actively listen and adapt brand strategies, firm capabilities and consequently firm resources (Hoyer et al., 2010; Iglesias et al., 2013).

#### **2.2.5.1.2 Employees**

The internal integration refers to a firm's coordination and collaboration of its organizational information, processes, and behaviors within a firm. According to Basnet (2013) collaboration starts first with internal integration among the different departments and functions within an organization to help improves the firm's performance by reducing costs and limiting the ability of departments within the organization from taking steps that would distort the overall goals of the organization (Ralston et al., 2015). Internal integration facilitates the translation of production demands into purchasing specifications and improves material movements and ordering processes (Palomero and Chalmeta, 2014). Through scheduled interdepartmental meetings or casual contacts, purchasing and production employees can exchange information and performance feedback (Paulraj and Chen, 2017). The use of cross-functional teams also enables purchasing and production departments to make joint decisions (Swink et al., 2007). This is pursued to connect functional departments and facilitates information and physical flows (Lai et al., 2012). Hence, internal integration has been identified as an important approach that helps firms develop their capabilities (Zhao et al., 2011).

Embedded in employee–customer interactions, brand value results because employees deliver brand experiences (Gyrd-Jones and Kornum, 2013) and communicate brand values and meanings to customers (Harris and de Chernatony, 2001) because employees perform tasks related to markets, customer information exchange, and customer acquisition (Jayachandran et al., 2015), these stakeholders have an important role in knowledge management processes. The knowledge and skills of employees are foundations for dynamic capabilities (Andries & Czarnitzki, 2014; Ayuso et al., 2016). This group of stakeholders also runs the daily management of the business operations of the firm for its continuous sustenance.

#### **2.2.5.1.3 Suppliers**

The support from this group of stakeholders is seen within the firm in the form of value creation opportunities, customer relationship experiences and new product development. Suppliers help the firm sense changes in customer needs and enhance information acquisition (Kim et al., 2013) which helps cultivate the firm's learning capability. Also, supplier relationships support the firm's ability to generate product innovations (Roy et al., 2014). Early collaborations with suppliers in the product development process support a firm with improved, integrative problem-solving capabilities (Takeishi, 2001). This group of stakeholders within the supply chain integration process promotes dynamic marketing capabilities, in the form of learning, innovation, and knowledge integration (Barrales-Molina et al., 2014; Lusch et al., 2010).

Supplier engagement in new product development (NPD) is typically characterized as the degree to which a buyer organization shares responsibility for the development and design of a new product's subsystems (or components) with a supplier organization (Takeishi, 2011). The length of the supplier's involvement in the project, the supplier's contribution to product development and design work, and the number and complexity of technical interfaces between the supplier and the customer have all been used as indicators of supplier involvement (Primo & Amundson, 2012). However, this narrow focus on the quantity and complexity of supplier involvement only characterizes the supplier's contribution to the project ,for example, despite a large supplier share (e.g., large supplier content and involvement throughout the project's duration) and frequent and intensive communication (e.g., many phone calls and face-to-face meetings), buyer



and supplier members may still lack more qualitative aspects of their interactive work process such as openness, mutual support, accommodation, and commitment to the project.

(Sofia and Anna,2013: Rajesh and Rajiv,2019) have long advocated the involvement of key suppliers in the new product development (NPD) and design process and have provided evidence for the structuring and implementation of supplier involvement at an organizational or strategic level. Such research has addressed important questions such as supplier selection (e.g., based on the suppliers' competencies), supplier relationship management (e.g., the formation of supplier partnerships), and the timing (i.e., how early in the overall innovation process from idea generation to product launch) and quantity (i.e., the supplier's share) of involvement (KPMG Australia, 2019: Great Learning, 2021).

#### **2.2.5.1.4 Secondary Stakeholder's support**

Secondary stakeholder groups are defined as those who influence or affect the firm, but who are not engaged in transactions with the firm and are not essential for its survival. The media and a wide range of special interest groups including non-governmental organization are considered as secondary stakeholders. They have the capacity to mobilize public opinion in favour of, or in opposition to, a firms' performance, as demonstrated in the cases of the recall of Tylenol by Johnson & Johnson (favorable) and the Exxon Valdez oil spill (unfavorable). The firm is not dependent for its survival on secondary stakeholder supports, however, such absence of such support can cause significant damage to a firm (Lankoski et al., 2016).

Dialogue and collaborations with this group of stakeholders can build a firm's ability to develop a new product and cultivate trust-based relationships with diverse constituent groups with non-economic goals. Such experiences also provide opportunities for firms to test new ideas, methods, or processes and expand their knowledge and skills beyond their current capabilities. For example, Dahan et al. (2010) said that when partnering with nongovernmental organizations (NGOs) to overcome social constraints, firms can access new knowledge and skills from the NGO partners and adapt to developing local markets for a new product. These collaborations also grant firms opportunities to improve their understanding of local markets, develop combinative skills, and introduce



novel products that reflect local constraints, which constitute unique dynamic capabilities to the firm (Teece, 2014). In summary, each stakeholder group has the potential to promote dynamic branding capabilities.

#### **2.2.5.2 Supplier- Firm Collaboration in Product Development**

Communication quality, cooperation, risk and reward sharing, and top management commitment on both sides all contribute to partnership-like conduct, according to organizational-level reasoning (Ying et al., 2018; Hui et al., 2019; Seyed et al., 2019). Strong buyer-supplier collaboration in the design and development of major product components allows the project's buyer and supplier participants to freely communicate necessary information (Ragatz et al., 2002; Takeishi, 2001).

Withholding technical information that impacts each other's design and development processes can result in subsequent revisions and reworks that are unneeded (Qingyu et al., 2011; Hui et al., 2017; Shengliang et al., 2018), information exchange is also necessary for planning work schedules and ensuring that the sequence is followed. Minimizes unwanted gaps or overlaps in responsibilities (Qingyu et al., 2011). When technical issues develop, the firm and supplier members must swiftly and completely inform one another of the new situation so that appropriate solutions can be sought jointly (James and Daniel, 2015).

Going into the project, both the firm and the supplier members may have some technical requirements, such as a generic product/part design or a base technology. To ensure the highest possible integrity of the overall product (including the supplier's component), the firm and supplier members will almost certainly need to understand each other's technical, budgetary, and organizational realities, as well as adapt to and accommodate each other in a mutually supportive manner (Kiger, 2019). Firm-Supplier collaboration, in the context of product creation with supplier engagement, involves promoting a cooperative rather than a competitive working environment, according to Paul and David (2016) buyer and supplier members working on a common project should show mutual respect, similar to productive teamwork in in-house projects (Jie and John, 2019) both teams need each other rather than attempting to dominate and pressure the other person, offer support when needed.

### **2.2.6 Competitive Advantage**

In recent years the concept of competitive advantage has taken center stage in discussions of business strategy. According to Henderson and Cockburn (1994); Oke and Adebajo (2014); Alexandra Twin (2023) competitive advantage exists when the firm is able to deliver the same benefits as competitors but at a lower cost (cost advantage), or deliver benefits that exceed those of competing products (differentiation advantage). Clark (1990) describes competitive advantage is a theory that seeks to address some of the criticisms of comparative advantage. Competitive advantage theory suggests that states and businesses should pursue policies that create high-quality goods to sell at high prices in the market. Porter (1995) emphasizes productivity growth as the focus of national strategies. Competitive advantage rests on the notion that cheap labor is ubiquitous and natural resources are not necessary for a good economy. Competitive advantage is necessary for satisfied customers who will receive higher value in delivered products for higher income what the owners request from management and such requirements can be fulfilled with organization of production, higher application and as low as possible production costs (Ranko et al., 2008). Also it provides the understanding that resources held by a firm and the business strategy will have a profound impact on generating competitive advantage. Barney (1991) suggested that the resources that are scarce and valuable at the same time can create competitive advantage, and if these resources are also difficult to duplicate, substitute and hard to deliver, they can sustain the advantage. Competitive advantage occurs when an organization acquires or develops an attribute or combination of attributes that allows it to outperform its competitors. These attributes can include access to natural resources, such as high-grade ores or inexpensive power, or access to highly trained and skilled personnel human resources. Above writings signify competitive advantage as the ability to stay ahead of present or potential competition, thus superior performance reached through competitive advantage will ensure market leadership. Also it provides the understanding that resources held by a firm and the business strategy will have a profound impact on generating competitive advantage. Barney (1991) emphasized the ability of firms to establish entry obstruction in order to prevent imitation from its competitors and take advantage of their resource for the purpose of sustaining the international competitive advantage.

## **2.3 Theoretical Review**

According to Blome et al. (2013) theoretical review is the examination of individual ideas or sets of theories addressing parts of human endeavour that may be useful in the explanation of events. It is an examination of hypotheses that support a research's conclusions. The theoretical framework is made up of theoretical principles, constructs, concepts, and tenants (Grant & Osanloo, 2014). The study's argument was built on the foundation of two ideas. The Resources Based View Theory (RBV) and Dynamic Capability Theory.

### **2.3.1 Resource Based View**

RBV posits that firms are a collection of resources, within which some of them can be considered to be strategic (Wernerfelt, 1984). Thus, firms that want to achieve a competitive advantage must combine resources in a unique and different way from other firms that might not be able to do it (Dyer and Singh, 1998). At the same time, a firm need to be concerned with the heterogeneous distribution of resources across firms involved in the integration processes (Barney, 1991). Therefore, the incentives for integration are laid on the acquisition of scarce and specific resources to protect and maintain the competitive advantage. In this way, the establishment of integrative links lead firms to leverage, as much as possible, the resources and knowledge of their suppliers and customers (Fawcett and Magnan, 2002) and, especially, to maintain this over time. This would allow them to maintain efficiency and be responsive to dynamic market needs.

The focused of RBV on the resources or capabilities of the firm's critical resources may reach beyond firm boundaries (Dyer and Singh, 1998). Within this, elements such as trust, frequency of interaction or commitment are characteristics that help to understand these relationships. Through this, firms are able to maintain viable relationship, attain performances jointly which are above the average and of which could not be achieved in isolation but made possible through the combined contributions of integrated partners (Dyer and Singh, 1998; Lavie, 2006).

Also, as Supplier capabilities on new product development offers barriers to imitation, mainly derived from inimitable specialized assets from the suppliers and other firms, skills and information, it may help to attain a sustainable competitive advantage.



Therefore, the ability of firms to create interactive rents by using collaboration and complementary resources is tied to elements such as prior integration experience, investment in their internal capability to the search for partners, and the ability to occupy information-rich positions within networks (Ritala and Ellonen, 2010).

### **2.3.2 Dynamic Capabilities Theory**

The dynamic capabilities theory proposed by Teece and Pisano (1994) is the extension from the company's resource-based point of view (RBV) (Barney, 1986, 1991). Based on the RBV, companies in the similar industry behave differently because they have different resources and skills (Barney, 1986, 1991; Peretaf, 1993). The RBV being viewed as static and not sufficient to give the company a competitive advantage explain in the changing market environment (Priem & Butler, 2001). Additionally, the company's resource-based view looks at the company's unique, rare, and imitable resources that have created competitive advantage and business growth (Barney, 1986). However, the process of maintaining competitive advantage is limitless and the process is dynamic (Yang et al., 2010) so scientists have suggested that in order to stay competitive in the market, the company should develop specific skills and continuous learning (Argyris & Schon, 1978; Hammer, 2001; Jashapara, 1993; Senge, 1990; Zott, 2003) which applies from the perspective of dynamic capabilities in particular in a new or changing market environment (Wilden et al., 2013). The lack of dynamic skills will make it impossible for the company to maintain its competitive advantage, especially in a changing environment (Gnizy et al., 2014). The application of dynamic capabilities in past literature has shown increasing interest among scholars since the inception of the international literature on ambidexterity (Hsu et al., 2013; Luo, 2002; Luo & Rui, 2009; Prange & Verdier, 2011) explain ambidexterity as a company's ability to respond to environmental complexity and international experience in doing international business (Hsu et al., 2013).

According to dynamic capabilities theory, markets are more dynamic and companies differ in the skills they acquire and use different resources. These discrepancies explain the differences in performance between firms over time (Wang & Kim, 2017). Teece et al. (1997) describes dynamic skills as higher-order skills for selecting, developing and coordinating common skills, i.e., to capture, grasp and transform. These skills also enable companies to transform information based on their needs. It also encourages



learning and experimentation, combines resources for the creation of a new product, and transforms existing systems (Jiang et al., 2016). A company with dynamic capabilities can integrate and redeploy knowledge sources to achieve higher performance. Previous studies have accepted that dynamic capability theory can lead organizations to perform (Khan et al., 2021).

## **2.4 Empirical Literature Review**

According to Blome et al. (2013) empirical research is defined as any study in which the study's results are obtained solely from concretely empirical evidence, and hence verifiable evidence. This study thus presents below some empirical literature related to its respective objectives:

### **2.4.1 Process Capabilities on Collaboration**

Squire et al. (2009) researched on the effect of supplier manufacturing capabilities on buyer responsiveness. This study examines the relationships between supplier capabilities, supply chain collaboration and buyer responsiveness using Extended Resource-based View (ERBV) theory. The sample used was drawn from UK manufacturing firms across eight Industry sectors. Data are analyzed using a three-step hierarchical regression model to investigate main, interaction and quadratic effects. The results indicate that suppliers' capabilities (flexibility, responsiveness and modularity) directly impact buyer responsiveness but that the level of buyer-supplier collaboration moderates this relationship. Furthermore, the results show a curvilinear relationship directly between collaboration and buyer responsiveness, whereby there is an optimal point beyond which returns on the relationship decline.

Process capabilities can have a positive influence on collaboration in Africa and Ghana. A case study of a Ghanaian manufacturing company by Boateng and Ofori-Danso (2023) used interviews and observations to collect data from a single company. The study found that, company's high level of process capabilities enabled it to collaborate effectively with its suppliers and customers.

A survey of over 200 businesses in Ghana by Agyapong and Owusu (2022) used a quantitative research design. The research indicates that businesses with high levels of

process capabilities were more likely to collaborate with their suppliers and customers. The survey also found that knowledge management played a mediating role in the relationship between process capabilities and collaboration.

A literature review by Otieno and Otieno (2021) used a qualitative research design to synthesize the findings of previous studies on the influence of process capabilities on collaboration in Africa. The study found that process capabilities can enable collaboration by improving communication, coordination, and trust between partners. The review also found that collaboration can lead to innovation by facilitating the sharing of knowledge and resources.

A case study of a Ghanaian supply chain by Adebola and Oyewale (2020) used interviews and observations to collect data from a single supply chain. The research indicates that supply chain's high level of process capabilities enabled it to collaborate effectively among its members. The study also found that the supply chain's collaborative efforts led to improved performance, including reduced costs and shorter lead times.

A literature review by Ofori-Danso and Owusu-Ansah (2019) used a qualitative research design to synthesize the findings of previous studies on the influence of process capabilities on collaboration in Africa. The authors found that process capabilities can enable collaboration by improving the overall performance of organizations. The review also found that collaboration can help organizations to improve their process capabilities by facilitating the sharing of knowledge and best practices.

#### **2.4.2 Supplier Capabilities on Collaboration**

Javanmard (2011) conducted research on the role of supplier capabilities in buyer responsiveness which aimed at exploring the role of supplier capabilities and their collaboration in buyer responsiveness. Resource-based View (RBV) theory was used. The research sample was studied during the period of four month in production workshops located in Lauriston and Hamedan Provinces in Iran. In order to relate supply flexibility and responsiveness and also to model the effect of supplier collaboration on buyer responsiveness. The results reveal that production flexibility,

supplier responsiveness, production modularity and supplier collaboration have a positive and meaningful impact on the buyer responsiveness.

Pressey et al. (2009) conducted research on purchasing practices in small- to medium-sized enterprise: An examination of strategic purchasing adoption, supplier evaluation and supplier capabilities. The goal of the study is to investigate the degree to which purchasing is regarded as a 'strategic' activity by SMEs, the use of supplier evaluation systems by SMEs and the supplier capabilities emphasized by SME buyer. The RBV theory was used. A survey of UK SME managers was conducted. It was found that purchasing practices varied greatly across SMEs and SMEs differ in the capabilities they priorities, with three distinct groups evident. These groups are labeled 'holistic', 'process' and 'logistics' based on the supplier capabilities they emphasize. These three groups of firms also differed in terms of the emphasis they placed on strategic purchasing, supplier evaluation, technological focus and how they compete in their main markets, but not in terms of firm size or number of suppliers utilized

The influence of supplier capabilities and technology uncertainty on manufacturer-supplier collaboration was investigated by Oh and Rhee (2008). The purpose of this study is to identify the manufacturer-supplier collaboration (MSC) types in the automotive industry and factors that affect such collaboration. The theory used is RBV. The unit of analysis is 1st tier suppliers registered with Hyundai-KIA Motors Corporation (HKMC); a survey was conducted targeting these 1st tier suppliers. Then, hypotheses were tested using a hierarchical multiple regression analysis. First, five distinct MSC types were identified as follows: collaborative communication, collaboration in new car development, collaborative problem solving, strategic purchasing, and supplier development. Second, contrary to previous studies, suppliers' customer proliferation capability is found to affect MSC positively. Of suppliers' capabilities, flexibility, dependability improvement, module, design, and 2nd tier supplier development/coordination capabilities affect MSC positively. Third, while technology uncertainty is found to have a significant moderating effect on the influence supplier capabilities exercise over collaborative problem solving and strategic purchasing, it has no direct impact on any MSC type.

Lieshout et al. (2021) researched on a paper named the interrelatedness of organizational ambidexterity, dynamic capabilities and open innovation: a conceptual model towards a competitive advantage. This paper aims to explore how an open



innovation strategy complements the organization's ambidextrous strategy in attaining a competitive advantage. Organizational ambidexterity and dynamic capability theories are also explored to investigate the impact of open innovation on the organization's ambidextrous strategy and competitive advantage especially inbound and outbound open innovation. The authors conducted a systematic literature review using Boolean search techniques, which was focused on the research fields of the sub-areas of general management, strategy, innovation, organization studies, information management, entrepreneurship, international business, marketing, and economics, supplemented by the snowball technique. Organizations that combine their ambidextrous strategy with open innovation attributes achieve a competitive advantage through developing their dynamic capabilities by which organizations change their value proposition. This study also shows that an ambidextrous strategy should no longer be viewed as a structural solution implemented by management, but also as a bottom-up intervention. Additionally, the authors found that the organization's dynamic capabilities establish a feedback loop, which changes the organization's ambidextrous strategy to resolve the efficiency–agility paradox.

Ferreira (2019) researched dynamic capabilities, innovation and branding capabilities and their impact on competitive advantage and SME's performance in Portugal: the moderating effects of entrepreneurial orientation. The purpose of this paper is to understand the impact of dynamic capabilities (DC) (in the view of exploration and exploitation) on competitiveness and performance, considering the mediating role the innovation capability (IC) and branding capabilities (BC) on competitive advantage and firm's performance and the moderating role of entrepreneurial orientation (EO). This research used RBV theory. This investigation proposes a theoretical model tested using structural equation modelling (SEM). Multi-group analysis was performed to understand the moderating role of. A questionnaire survey was developed to explore the relations between DC and innovation variable. For this study, 387 valid questionnaires were collected from a sample of Portugal SME' firms. A 90-item questionnaire which consists to study the relationships among all the variables. The results show that exists a positive direct and indirect influence of DC on competitive advantage and performance variables and mediating impact the IC and BC



### **2.4.3 Collaboration in new product development**

Another study by Parker (2000) on interfirm collaboration and the new product development process investigated the issue of collaboration in new product development within the context of the South African textile and clothing industry using RBV theory. Data was extracted from a questionnaire sent to the 200 companies which were selected randomly from the South African Textile and Clothing Federation directories. Each selected company was contacted to ascertain the name of the person who had the greatest responsibility for new product development in the company, and the questionnaire was sent directly to that person. The finding strongly suggests that textile and clothing manufacturers believe that involvement of their customers and/or suppliers in the development of new products is highly beneficial in helping them gain a deeper understanding of customers' needs, and exploit opportunities.

Furthermore, in a paper named the impact of collaboration network on new product development, Chen (2019) researchers agreed that collaboration networks can be an important implement in a firm's innovation process, but there is limited empirical evidence on actually how they facilitate the new product development (NPD). The paper aims to discuss these issues organizational theory using longitudinal and multisource data on a sample of firms engaged in the Chinese automobile industry, the authors examine the structural properties of collaboration networks and their possible influences on firms' NPD performance. The results indicate that the structural features of the technology-based collaboration networks in the automobile industry have a low degree of collaborative integration and they influence firms' NPD performance in diverse ways. The authors find that the direct ties, indirect ties and structural holes of the collaboration networks are all positively associated with firms' number of new products. However, the authors have not found the evidence that the number of direct ties can moderate the relationship between the indirect ties and the NPD performance.

Buganza et al. (2007) also investigated on small and medium enterprises' collaborations with universities for new product development. This study explores the impact of multiple firm-level capabilities and those interactions on firm growth under different market conditions, using panel data from 612 U.S. public firms across 16 years in 60 industries. This study utilized Structural Equation model Secondary data. This paper combines a qualitative methodology (five SME case studies) with a quantitative one (a survey of 28 SMEs). The quantitative data are used to support the preliminary results

obtained through the qualitative analysis. SMEs engage in collaborations with universities following a progressive model; from the easiest collaborations during the testing phase to more complex collaborations during the research Phase. In this way, SMEs establish a trust-based relationship with universities. Furthermore, technology management capabilities and project management capabilities are crucial prerequisites for managing complex forms of collaboration with universities.

Similarly, Tsai et al. (2011) researched on supplier collaboration and new product performance: a contingency model. The purpose of this paper is to present a contingency model to examine how technological capacity, promotion capacity, and technological substitution affect the supplier collaboration-new product performance relationship. Using RBV theory, this study uses data from a Government survey of technological innovation. A total of 201 machinery/electronics equipment manufacturing firms in Taiwan comprise the sample. A Tobit regression analysis is adopted to analyze the data. It is found that technological capacity and promotion capacity enhance the effect of supplier collaboration on new product performance. Technological substitution mitigates the relationship between supplier collaboration and new product performance.

The study by Jiang (2015) focuses on the integration of IT resources and its impact on collaborative e-business capability. The research employed a quantitative, collecting data from organizations and analyzing the relationship between IT resource integration and collaborative e-business capability. The theory used in this study is the resource-based view (RBV), which suggests that a firm's unique resources and capabilities contribute to its competitive advantage. The findings of Jiang's study indicate that the integration of IT resources plays a foundational role in facilitating collaborative e-business capability

#### **2.4.4 Research and development on collaboration in product development**

In addition, imparts of innovation type SME's R&D capability on patent and new product development, a study by Kim et al. (2017) aimed to verify the effectiveness and efficiency of corporate technology innovation activities used RBV theory. This study empirically analyzes the effects of research and development (R&D) capability on patent and new product development achievements on innovation-type small- and

medium-sized enterprises (SMEs) by using the “Report on Korean Innovation Survey 2010: Manufacturing Sector” data released by the Science and Technology Policy Institute. The results of the study indicate that staffing of the concentration of R&D human resource team and efforts toward open innovation are essential factors for the creation of corporate performance. The number of persons of the concentration R&D team in particular makes up essential resources for patent acquisition and new product development. In addition, in case of an SME's with relatively poor resources, it is necessary to acquire resources, both material and immaterial, learn from the external R&D activities and internalize those into key corporate capabilities rather than step up the R&D activities on their own.

The study by Ebrahim et al. (2012) investigated the impact of virtual R&D teams on the cost and time of new product development in SMEs, used a quantitative survey method to collect data from 252 SMEs in Malaysia. The survey included questions about the use of virtual R&D teams, the cost of new product development, and the time to market for new products. The study found that virtual R&D teams were associated with a significant reduction in the cost and time of new product development. SMEs that used virtual R&D teams reported that they were able to reduce the cost of new product development by an average of 20% and the time to market for new products by an average of 15%. The study also found that the size and composition of virtual R&D teams had an impact on their effectiveness. SMEs that had larger and more diverse virtual R&D teams reported that they were able to reduce the cost and time of new product development to a greater extent.

Amankwah-Amoah and Sarpong (2014) conducted a quantitative study of 1,000 firms in 29 countries to investigate the relationship between R&D capability, knowledge creation process, and new product development (NPD) performance. They found that R&D capability has a positive and significant impact on NPD performance, and this impact is mediated by the firm's knowledge creation process. This suggests that firms that invest in R&D and are able to effectively create new knowledge are better positioned to develop and launch successful new products. The study also found that the impact of R&D capability on NPD performance is stronger in emerging markets than in developed markets. This may be due to the fact that emerging markets are characterized by more rapid technological change and higher levels of competition,



which means that firms in these markets need to invest in R&D in order to keep up with the latest trends and to develop new products that meet the needs of their customers.

Awate et al. (2015) conducted a quantitative study of 1,200 firms in 35 countries to investigate the relationship between international R&D, knowledge absorption and assimilation, and new product development (NPD) performance. They found that firms that internationalize their R&D functions by establishing R&D teams in multiple countries achieve better NPD performance. This is because international R&D teams have access to a wider range of knowledge and resources, which can help them to develop more innovative and successful new products.

The study also found that the impact of international R&D on NPD performance is mediated by knowledge absorption and assimilation. This suggests that firms need to be able to effectively absorb and assimilate the new knowledge that they gain from their international R&D teams in order to reap the full benefits of internationalization

Fosu and Amankwah-Amoah (2018) conducted a quantitative study of 300 firms in Ghana to investigate the relationship between R&D capability, firm size, and new product development (NPD) performance. They found that R&D capability has a positive and significant impact on NPD performance in Ghanaian firms. However, the impact of R&D capability is moderated by the firm's size. The study found that the impact of R&D capability on NPD performance is stronger in large firms than in small firms. This suggests that small firms in Ghana may need to find collaborative ways to invest in R&D in order to compete in the global marketplace. For example, small firms could partner with other firms or universities to conduct R&D. They could also outsource their R&D activities to specialized firms.

Overall, the findings of this study suggest that R&D capability is an important driver of NPD performance in Ghanaian firms, but that the impact of R&D capability is stronger in large firms than in small firms. Small firms in Ghana need to find ways to invest in R&D in order to compete in the global marketplace

The summarized empirical evidence is presented in the table 2.2 below:



**Table 2.2: Summary of Empirical Review**

AUTHOR (S) / YEAR	MAIN PURPOSE	UNDERLINING THEORIES	METHOD	MAIN FINDING
Brian Squire and Paul D. Cousins, Benn Lawson, Steve Brown (2009)	The purpose of this paper is to examine the relationships between supplier capabilities, supply chain collaboration and buyer responsiveness.	ERBV	The sample is drawn from UK manufacturing firms across eight Industry sectors. Data are analysed using a three-step hierarchical regression model to investigate main, interaction and quadratic effects	The results indicate that suppliers' capabilities (flexibility, responsiveness and modularity) directly impact buyer responsiveness but that the level of buyer-supplier collaboration moderates this relationship. Furthermore, the results show a curvilinear relationship directly between collaboration and buyer responsiveness, whereby there is an optimal point beyond which returns on the relationship decline
Habibollah Javanmard (2011)	the present research aims at exploring the role of supplier capabilities and their collaboration in buyer responsiveness	RBV	The research sample includes production Workshops located in Lauriston and Hamedan Provinces in Iran which have been studied during a four-month period. In order to relate supply flexibility and responsiveness and also to model the effect of supplier collaboration on buyer responsiveness	The results reveal that production flexibility, supplier responsiveness, production modularity and supplier collaboration have a positive and meaningful impact on the buyer responsiveness

Minseo Kim, Ji-eung Kim and Yeong-wha Sawng Kwang-sun Lim (2017)	This study aims to verify the effectiveness and efficiency of corporate technology innovation activities	RBV theories	This study empirically analyzes the effects of research and development (R&D) capability on patent and new product development achievements on innovation-type small- and medium-sized enterprises (SMEs) by using the “Report on Korean Innovation Survey 2010: Manufacturing Sector” data released by the Science and Technology Policy Institute	The results of the study indicate that staffing of the concentration of R&D human resource team and efforts toward open innovation are essential factors for the creation of corporate performance. The number of persons of the concentration R&D team in particular makes up essential resources for patent acquisition and new product development. In addition, in case of an SME’s with relatively poor resources, it is necessary to acquire resources, both material and immaterial, learn from the external R&D activities and internalize those into key corporate capabilities rather than step up the R&D activities on Their own.
Hamieda Parker (2000)	This study investigated the issue of collaboration in new product development within the context of the South African textile and clothing industry	RBV	The 200 companies which were sent a questionnaire were randomly selected from the South African Textile and Clothing Federation directories. Each selected company was contacted to ascertain the name of the person who had the greatest responsibility for new product development in the company, and the questionnaire was Sent directly to that person.	The finding strongly suggests that textile and clothing manufacturers believe that involvement of their customers and/or suppliers in the development of new products is highly beneficial in helping them gain a deeper understanding of customers' needs, and exploit opportunities

Peizhen Chen (2019)	Researchers agree that collaboration networks can be an important implement in a firm's innovation process, but there is limited empirical evidence on actually how they facilitate the new product development (NPD). The paper aims to discuss these issues	Organisational theory	Using longitudinal and multisource data on a sample of firms engaged in the Chinese automobile industry, the authors examine the structural properties of collaboration networks and their possible influences on firms' NPD performance.	The results indicate that the structural features of the technology-based collaboration networks in the automobile industry have a low degree of collaborative integration and they influence firms' NPD performance in diverse ways. The authors find that the direct ties, indirect ties and structural holes of the collaboration networks are all positively associated with firms' number of new products. However, the authors have not found the evidence that the number of direct ties can moderate the relationship between the indirect ties and the NPD performance
Tommaso Buganza, Gabriele Colombo and Paolo Landoni (2007)	this study explores the impact of multiple firm-level capabilities and them interactions on firm growth under different market conditions, using panel data from 612 U.S. public firms across 16 years in 60 industries.		Structural Equation model Secondary data. This paper combines a qualitative methodology (five SME case studies) with a quantitative one (a survey of 28 SMEs). The quantitative data are used to support the preliminary results obtained through the qualitative analysis	SMEs engage in collaborations with universities following a progressive model; from the easiest collaborations during the testing phase to more complex collaborations during the research Phase. In this way, SMEs establish a trust-based relationship with universities. Furthermore, technology management capabilities and project management capabilities are crucial prerequisites for managing complex forms of collaboration with universities,

Axel Finstorp & Ferdinand Padang (2016)	To explore how family firms perceive R&D investments in the first place by utilizing Swedish family firms as the context which is aimed to provide a new viewpoint on R&D investments in family firms from an in-depth approach	RBV	The study applies multiple case studies strategy with six cases in total and eight respondents. To support the study, semi-structured interview is used to collect the data, in addition to researcher's note, a cross-case analysis is conducted to observe emerging patterns which are used to further adapt the preliminary conceptual framework made from frame of references	The study to identify influencing factors of R&D investments. They developed a conceptual model that illustrated the phenomenon and the factors that potentially influenced it
Walter, J. Ongeti and Vincent, N. Machuki, (2018)	aimed to investigate the influence of organizational resources on the performance of Kenyan state corporations	RBV	The researchers collected data on resources and performance from 63 Kenyan state corporations and analyzed it using both descriptive and inferential statistics	The findings report a statistically significant relationship between aggregated organizational resources and performance. However, organizational resources could only explain 8.3 percent of performance of Kenyan state corporations. Results of the independent effect of disaggregated organizational resources indicated statistically significant effect of tangible, human and intangible resources on performance
Petteri Annunen, Erno Mustonen, Janne Harkonen and Harri Haapasalo 2021	The study aims to focus on creating sales capability as part of new product development (NPD). The aim is to define	RBV	An inductive and qualitative research method was used to construct a sales capability creation process based on	The results indicate that the status of companies' sales-related planning varies during the NPD, and the related activities are not systematically



	generic requirements for building sales capability as a part of NPD and to propose a necessary process by defining key activities for sales readiness		a current state analysis in seven companies.	managed. Considering sales early is necessary to enable a smooth and cost-efficient start of sales, and to avoid unnecessary delays and problems in other functions. At the same time, the companies recognise the need for improvement
Kuen-Hung Tsai Mu-Lin Tsai Jiann-Chyuan Wang (2011)	The purpose of this paper is to present a contingency model to examine how technological capacity, promotion capacity, and technological substitution affect the supplier collaboration-new product performance relationship	RBV	This study uses data from a Government survey of technological innovation. A total of 201 machinery/electronics equipment manufacturing firms in Taiwan comprise the sample. A Tobit regression analysis is adopted to analyze the data.	It is found that technological capacity and promotion capacity enhance the effect of supplier collaboration on new product performance. Technological substitution mitigates the relationship between supplier collaboration and new product performance.
Andrew D. Pressey a, Heidi M. Winklhofer b , Nikolaos X. Tzokas a (2009)	To investigate the degree to which purchasing is regarded as a 'strategic' activity by SMEs, the use of supplier evaluation systems by SMEs and the supplier capabilities emphasized by SME buyer	RBV	a survey of UK SME managers, we find that purchasing practices varied greatly across SMEs	we find that SMEs differ in the capabilities they prioritise, with three distinct groups evident. These groups are labelled 'holistic', 'process' and 'logistics' based on the supplier capabilities they emphasise. These three groups of firms also differed in terms of the emphasis they placed on strategic purchasing, supplier evaluation, technological focus and how they compete in their main markets, but not in terms of firm size or number of suppliers utilised

Winit Sueptaetrakun SorasakTangthong (2018)	to examine the influence of collaboration and innovation on the performance of Thailand's automotive parts industry	RBV	The researchers employed a quantitative research method to study 250 automotive parts entrepreneurs in Thailand. They used questionnaires to collect data and SEM statistical modeling technique was used in the data analysis	The research found that organizations with significant emphasis on supplier, internal and customer collaboration were able to create product, process, service and organization innovation that had significant impacts on the organization performance of Thailand's automotive parts industry regarding customer retention, employee satisfaction, cost reduction and organization growth
Feng Zhang and Lei Zhu (2020)	To develop a conceptual framework for collaborative capability, including scanning, relational skills and adaptation and to test the impact of each dimension on the acquisition of technological and marketing knowledge from partners.	Dynamic Capability	This study builds a theoretical framework and tests it with survey data from 289 Chinese manufacturing firms.	Firms with strong collaborative capability are identified to gain better knowledge acquisition from their partners and achieve higher NPD performance. While acquired technological knowledge has a greater effect on NPD creativity than acquired marketing knowledge, the latter has a greater effect on NPD speed. In addition, these two types of knowledge acquisition form different mediating paths between collaborative capability and NPD performance

Joongsan Oh Seung-Kyu Rhee (2008)	The purpose of this study is to identify the manufacturer-supplier collaboration (MSC) types in the automotive industry and factors that affect such collaboration	RBV	The unit of analysis is 1st tier suppliers registered with Hyundai-KIA Motors Corporation (HKMC); a survey was conducted targeting these 1st tier suppliers. Then, hypotheses were tested using a hierarchical multiple regression analysis	First, five distinct MSC types were identified as follows: collaborative communication, collaboration in new car development, collaborative problem solving, strategic purchasing, and supplier development. Second, contrary to previous studies, suppliers' customer proliferation capability is found to affect MSC positively. Of suppliers' capabilities, flexibility, dependability improvement, module, design, and 2nd tier supplier development/coordination capabilities affect MSC positively. Third, while technology uncertainty is found to have a significant moderating effect on the influence supplier capabilities exercise over collaborative problem solving and strategic purchasing, it has no direct impact on any MSC type
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<p>Johannes W.F.C. van Lieshout, Jeroen M. van der Velden, Robert J. Blomme and Pascale Peters (2021)</p>	<p>Establishing a competitive advantage in today's dynamic environment involves optimizing an organization's exploration and exploitation strategy. This paper aims to explore how an open innovation strategy complements the organization's ambidextrous strategy in attaining a competitive advantage. Organizational ambidexterity and dynamic capability theories are also explored to investigate the impact of open innovation on the organization's ambidextrous strategy and competitive advantage – especially inbound and outbound open innovation</p>	<p>Organizational ambidexterity and dynamic capability theories</p>	<p>The authors conducted a systematic literature review using Boolean search techniques, which was focused on the research fields of the sub-areas of general management, strategy, innovation, organization studies, information management, entrepreneurship, international business, marketing, and economics, supplemented by the snowball technique</p>	<p>Organizations that combine their ambidextrous strategy with open innovation attributes achieve a competitive advantage through developing their dynamic capabilities by which organizations change their value proposition. This study also shows that an ambidextrous strategy should no longer be viewed as a structural solution implemented by management, but also as a bottom-up intervention. Additionally, the authors found that the organization's dynamic capabilities establish a feedback loop, which changes the organization's ambidextrous strategy to resolve the efficiency–agility paradox</p>
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Michael G. Jacobides and Sidney Winter (2015)	To examine the relationship between transaction cost and capabilities in the determination in vertical scope in firms	RBV	the method used in the paper is a combination of theoretical analysis and historical case studies. They develop a framework to explain how transaction costs and capabilities co-evolve and affect the vertical scope of firms. They use the framework to examine two industries: the mortgage banking industry in the US, which underwent a process of vertical disintegration; and the Swiss watch manufacturing industry, which experienced a reversal from vertical specialization to integration	Findings of the paper are that capability differences are a necessary condition for vertical specialization, and that transaction cost reductions only lead to specialization when capabilities along the value chain are heterogeneous. The paper also shows that there are four evolutionary mechanisms that shape vertical scope over time: selection, transaction cost endogeneity, capability development, and capability pool change.
Luiz Artur Ledur Brito1 Patrícia Kawai Sauan (2016)	to explore how management practices affect the performance of firms in an emerging country, Brazil, and to propose a theoretical framework that views management practices as capabilities.	RBV	The method used in the study was a survey of 124 companies in the packaging industry in Brazil, using a questionnaire based on the World Management Survey. The questionnaire measured 18 management practices related to operations, performance monitoring, target setting, and people management. The authors also collected data on the firms' profitability, growth, productivity, size, ownership, and managerial	he main findings of the study were:  There was a positive and significant relationship between the level of management practices and the three dimensions of performance (profitability, growth, and productivity). Management practices can be conceptualized as capabilities that enable firms to achieve superior performance by creating and exploiting valuable resources.

			hubris. The authors used descriptive statistics, correlation analysis, and regression analysis to test their hypotheses.	
Sandeep Salunke,* Jay Weerawardena , Janet R. McColl- Kennedy 2019	This study examines how B2B service firms organize and manage knowledge in order to deliver new value adding solutions and in turn competitive advantage, addressing calls for research into this important, yet neglected area. Specifically	RBV	models and empirically tests the links between KIC and service innovation, and in turn sustainable competitive advantage (SCA)	Findings from our research of Australian and US project-oriented firms support our central theorization that the new knowledge acquired through external and internal sources per se is not sufficient, but should be integrated with existing knowledge in order to deliver innovative service solutions addressing clients' needs
Kristijan Mirkovski , Frederik von Briel , Paul Benjamin Lowry, Libo Liu 2023	The purpose of the study is to explore how service intermediaries can help firms achieve entrepreneurial growth despite their resource and capability constraints	RBV	The study focuses on the case of two small wineries from North Macedonia that used service intermediaries to develop and enter new markets abroad.	Service intermediaries can act as external managers who orchestrate complementary external resources and capabilities on behalf of their clients, thereby enabling them to exploit growth opportunities that they otherwise could not.
Hongyun Tian, Samuel Kofi Otchere, Cephas P. K. Coffie, Isaac Adjei Mensah and Raphael Kwame Baku 2021	aims to find out the relationships between supply chain integration, interfirm value co-creation, and firm performance in Ghanaian SMEs	RBV	Structural equation model (SEM) to estimate the responses of 473 SMEs registered with the Association of Ghanaian Industries (AGI) to find the nexus between supply chain integration, interfirm value co-creation, and the performance of Ghanaian SMEs.	There is a positive significant relationship between the variables. Innovation capability mediates the positive relationship between supply chain integration and firm performance. Interfirm value co-creation has a negative relationship with the innovation capabilities of SMEs. Therefore, Ghanaian SMEs can invest

				in technologies, which promote collaborations with external parties to create value while minimizing cost
Muhammad Mohiuddin, Zhan Su 2014	The objective of this study is to demonstrate the relationship between outsourcing of core and non-core activities and integrated firm-level performance (IFLP) consisting of competitive, financial, strategic, and stakeholders' performance	RBV	Empirical data was collected from manufacturing small and medium size enterprises (SMEs) in Quebec that outsource, using a web-based questionnaire. A linear regression analysis was performed to establish the relationship between outsourcing and IFLP	The findings show that outsourcing of non-core activities and insourcing (internalization) of core activities have a positive impact on a firm's integrated performance. The findings also demonstrate that offshore outsourcing enhances the economic, social, and strategic performances of manufacturing SMEs
Wang, Wen-Cheng, Lin, Chien-Hung, Chu, Ying-Chien 2011	The purpose of the study is to explore the internal sources of competitive advantage for an organization and how they are related to its resources, capabilities, and core competencies	RBV	The method used is a literature review, which involves analyzing the existing theories and concepts of competitive advantage from various sources.	The findings are that the internal sources of competitive advantage cover a wide range of areas, such as structure, process, culture, and people, and that they can be achieved through proper management action
Akram Sadat Hosseini, Sanaz Soltani and Mohammad Mehdizadeh 2018	The purpose of the study is to identify and rate the competitive advantage factors in new product development in the Toos Niroo technical firm, which is a leading company in the manufacturing industry in Iran	RBV	The method used is a descriptive survey methodology, which involves collecting data from a sample of 50 experts and top managers at the firm using a questionnaire	The findings are that the competitive advantage factors of quality, efficiency, innovation, and accountability are positively and significantly related to new product development. This means that these factors can help the firm to develop new products that meet the needs and expectations of its customers and gain an edge over its competitors.



Jens Konopik , Christoph Jahn , Tassilo Schuster , Nadja Hoßbach , Alexander Pflaum 2022	The purpose of the study is to identify and categorize the organizational capabilities that are relevant for managing digital transformation, and to propose a conceptual framework that shows how these capabilities evolve throughout the transformation process	Dynamic capabilities theory	The method used by the study is a comprehensive literature review, in which the authors searched for relevant articles on organizational capabilities and digital transformation in various databases and journals. They then analyzed the articles using a qualitative content analysis approach, and extracted 32 organizational capabilities that were mentioned in the literature. They also clustered these capabilities into seven themes, such as strategic alignment, innovation, and agility	The findings of the study are that organizational capabilities are essential for mastering digital transformation, and that different capabilities are needed at different stages of the transformation process. The authors suggest that the dynamic capability theory can be used to explain how organizations develop and adapt their capabilities over time.
Jorge Ferreira Arnaldo Coelho (2019)	The purpose of this paper is to understand the impact of dynamic capabilities (DC) (in the view of exploration and exploitation) on competitiveness and performance, considering the mediating role the innovation capability (IC) and branding capabilities (BC) on competitive advantage and firm's performance and the moderating role of entrepreneurial orientation (EO).	RBV	This investigation proposes a theoretical model tested using structural equation modelling (SEM). Multi-group analysis was performed to understand the moderating role of. A questionnaire survey was developed to explore the relations between DC and innovation variable. For this study, 387 valid questionnaires were collected from a sample of Portugal SME' firms. A 90-item questionnaire which consists to	The results show that exists a positive direct and indirect influence of DC on competitive Advantage and performance variables and mediating impact the IC and BC.

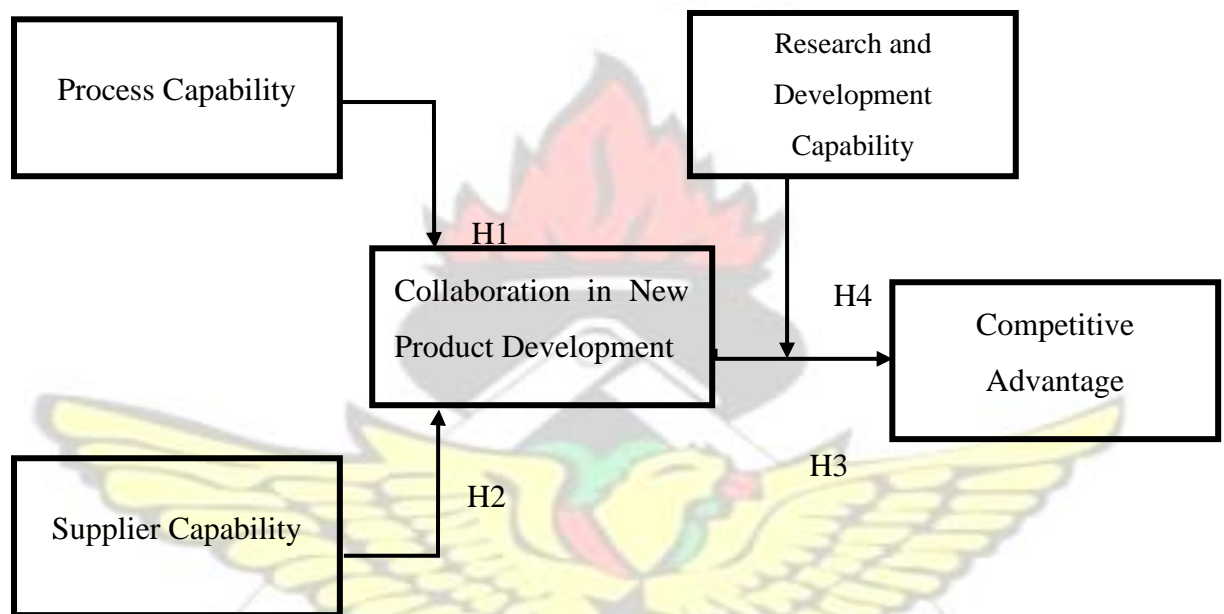


			study the relationships among all the variables	
Benjamin Tukamuhabwa, Henry Mutebi and Rhona Kyomuhendo (2021)	The purpose of this paper is to explore the relationship between supply chain management practices, logistics capabilities, logistics integration and competitive advantage of Small and Medium Enterprises (SMEs) in a developing country	RBV	Using a structured questionnaire survey, cross-sectional data collected from 204 SMEs in Kampala – Uganda was analysed using exploratory and confirmatory factor analysis, and Structural Equation Modelling (SEM) using AMOS version 26 to validate the theorised relationships	The study findings revealed that both supply chain management practices and logistics integration are positively and significantly associated with competitive advantage. Also, both supply chain management practices and logistics capabilities are positively and significantly associated with logistics integration. Additionally, the authors found that logistics integration partially mediates in the relationships between supply chain management practices and competitive advantage, and logistics capabilities and competitive advantage. Conclusively, the three independent variables collectively account for 11% variance in competitive advantage of SMEs
María Jesús NIETO Alicia RODRÍGUEZ (2017)	We build on the knowledge-based view to study the relative impact of alternative sources of R&D on innovation performance	RBV	We use the Technological Innovation Panel (TIP) to analyze these ideas. This panel is compiled by Spain's National Statistics Institute, Science and Technology Foundation, and Foundation for 8 Technical Innovation	The results reveal the relative contribution of different R&D sources on innovation

## 2.5 Conceptual Framework

The goal of this research is to find out how process and supplier capabilities, collaboration in new product development and competitive advantage, and the moderating effect of research and development capabilities in SMEs are related. Capability, according to the RBV, is the combination of different resources which cannot be imitated and also enhances firm performance (Walter and Vincent, 2018). Chen and Chen (2003) proposed that a firm's resources be separated into R&D, production, and marketing Resources for marketing When the concept of productive capabilities (Jacobides and Winter, 2005) is linked with the division of resources, production and R&D capabilities emerge as the two key productive capabilities in the automobile components sector. Production capability is divided into dependability improvement, cost reduction, quality improvement, and flexibility and is related to competitive (Winit and Sorasak, 2018), R&D capability (or technology capability) refers to a company's ability to add value to process of production through technologies (Winit and Sorasak, 2018) which can be measured in terms of patents, R&D workers, R&D spending, and other factors (OECD, 2018). During our early interviews, however, suppliers claimed that such concrete steps, taken without adequate evaluation of technological know-how and other factors, would be counterproductive. Only a portion of the genuine R&D capability would be captured by corporate culture. The suppliers polled expressed a strong desire to improve their design capabilities and develop new products based on future technology. Furthermore, as R&D operations and the automotive industry in general have shifted toward modularization. Modularization competence has become more important (Doran, 2003; Hsuan, 1999, 2003). As a result, we diversified R&D expertise into engineering, design, and research and development. In new product development, "collaboration" refers to the active involvement of suppliers in the development process from the beginning in order to increase quality and save development time and costs. Co-design, quality evaluation, and specification writing are the core activities of collaboration in new product development. Changes in customer testing and demand uncertainties, as well as increased component complexity and unique part functionalities, necessitate greater interaction with suppliers (Chen and Paulraj, 2019). The competitive advantage gained from such collaboration can be divided into two categories: incomparable gains from producing value (Ida- Farida et al., 2022) and monopoly or Ricardian rent. We put the concept of competitiveness into

practice, rather than focusing just on the performance of new product development projects, companies should evaluate their overall operational performance in terms of cost and quality competitiveness, customer happiness, and product diversity.



**Figure 2.1 Conceptual Framework**

Source: Fieldwork, 2022

### **2.5.1 The Relationship between Process Capability and Collaboration in New Product Development.**

Simplest way to define process capabilities is by describing it as the function that makes the process. It includes complex processes, principles, techniques and tasks (Chan, 2019). Chan (2019) defines Process capability as the ability of a process to produce products or services that meet the specified requirements. Many industries now use process capability to assess the ability of a process to meet customer requirements. Collaboration in new product development is a capability which generate the market success and NPD is as good as the NPD process is (Delgado, 2023). NPD process aims

to refine product ideas up to the product launch, including product design and operations planning (Feng and Lei, 2020). NPD process has several definitions, but one of the well-known is the stage-gate system. The result of process capabilities and collaboration in new product development could be used for new design applications, inspection planning and evaluation techniques (Chen, 2019). As a result, *it is hypothesized that*

*H1: Process capability has a significant and positive influence on New Product Development*

### **2.5.2 Influences of Supplier Capabilities on the Collaboration in new Product Development.**

In order to develop a lasting competitive advantage, a firm may require the capabilities of other firms (Sandeep et al., 2019), therefore obtaining those complementary capabilities will allow a firm to grow steadily by overcoming its resource-based limits (Kristijan et al., 2023). As a result, other firms' complementary resources can be a source of relational rent (Laurel, 2014) For example, the quality of a product is influenced by the component parts it receives from suppliers, and the quality of the component parts is influenced by the suppliers' production and R&D skills. As a result, the capabilities of suppliers have an impact on the quality level of a new product and, as a result, the competitive advantage of a SMEs in Ghana. In this aspect, (Hongyun et al., 2021) claim is important: the assets allocated to a company by suppliers have a direct impact on the company's competitive edge. The growing transfer of previously conducted work to first-tier suppliers, combined with extended modularization and firm-wide supply-base reduction initiatives, has resulted in a rapid increase in outsourcing to suppliers (Muhammad, 2014; Dmitrij et al., 2014). As a result, supplier capabilities will continue to have an impact on firms' collaboration in new product development (Oh and Rhee, 2010). As a result, the following possibilities are put forth:

*H2 supplier capacity has a positive influence on a company's collaboration in new product development.*



### **2.5.3 Influence of Collaboration in New Product Development on Competitive Advantage.**

A company lacking the capabilities needed to establish competitive advantage will foster inter-organizational relationships in order to obtain such capabilities from another enterprise (Agnieszka and Marcel, 2019; Hoyer et al., 2010). Collaborative product development, according to (Hoyer et al., 2010) is the application of team collaboration strategies to an organization's product development initiatives. In addition, in a customer-focused environment, collaborative product creation includes concurrency, attention to the life cycle, suppliers, and information technology. Competitive advantage as the ability to stay ahead of present or potential competition, thus superior performance reached through competitive advantage will ensure market leadership (Wang et al., 2011) emphasized the ability of firms to establish entry obstruction in order to prevent imitation from its competitors and take advantage of their resource for the purpose of sustaining the international competitive advantage. Traditional sources of competitive advantage such as financial and natural resources, technology and economies of scale can be used to create value. However, the resource-based argument is that these sources are increasingly accessible and easy to imitate. Thus they are less significant for competitive advantage especially in comparison to a complex social structure such as an employment system. If that is so, collaboration in new product development may be an especially important source of sustained competitive advantage (Akram et al., 2018). As a result, *it is hypothesized that*

*H3: Collaboration in New Product Development positively relate with competitive advantage.*

### **2.5.4 The moderating effect of research and development capabilities on the relationship between collaboration in new product development and competitive advantage**

Albeit the available literature, available data on the moderation role of Research and Development Capabilities on CNPD and CA fall short. The role of research and development capabilities on collaboration in new product development cannot be left out in efficiency discussions. Research and Development Capabilities bring improvement and change within an organizational product development and also

affects competitive advantage. The study revealed that R&D capabilities (digital innovation) of an organization brings the improvement and change within the organization (Jens et al., 2022). Therefore, to achieve competitive advantage, research and development is important. The majority of developing economies spend less than 0.5% of their GDP on R&D (World Economic Forum, 2017). A study by Korean innovation survey (2010) found that there is a significant relationship between research and development and collaboration in new product development. The presence of R&D capabilities in enabling organization's to reach market faster such as collaboration in new product development is seen as effective. The study revealed the fact that the R&D capabilities as an asset which can bring improvement and change within the organization. As a result, the productivity and the competitive advantage of the organization is increased. Research and development (R&D) can have a significant influence on the relationship between collaboration in new product development and competitive advantage (Oh and Rhee, 2010). Collaboration in R&D can lead to the sharing of knowledge and resources, which can speed up the development process and increase the chances of creating a successful new product. This can give a company a competitive advantage over rivals who are working independently. Additionally, (David et al., 2023; Astrid and Bjørge, 2017) collaborating with external partners, such as suppliers or customers, can provide access to new technologies or markets, further enhancing a company's competitive position. In line with the above, this study sees R&D capabilities as a necessary condition or requirement to strengthen the effect of collaboration in new product development and competitive advantage, such that the more the firms' R&D capabilities supports the implementation of CNPD, the more they reap the full benefit.

Thus, the study proposes this hypothesis:

*H4: research and development positively and significantly moderates the relationship between collaboration in new product development capabilities and firms' competitive advantage*

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Introduction**

The chapter of this study was based on the methodology adopted to collate responses. The chapter three focused on the study design, study approach, population, sample and sampling techniques, form of data, procedure used to collate the data for the study, ethical consideration, reliability and validity as well as data analysis. These sub-headings were used for the methodology adopted on the study that was on the influences of process and supplier capability on collaboration in new product development on competitive advantage: Moderating effect of Research and Development capability.

#### **3.1 Research Design**

Research design is the general method for addressing research questions. Research design. It is a key scheme in which a researcher tries to address questions about thesis. Research design is a technique, structure and methodology for sample evaluation to achieve research findings. The research design helps the researchers to assess whether the analysis is a quantitative, qualitative, inductive or deductive approach to achieve the desired results by evaluating the methods used in the study. This simplifies the different analysis methods, making the study as effective as possible so that more knowledge can be generated with less effort, time and resources. The research design has a major impact on the accuracy of the findings obtained as it forms the basis for a strategy to reliably determine the causes and effects of the variables under analysis (Saunders et al., 2009; Ogula, 2005).

Explanatory, exploratory or descriptive studies are the type of research design research (Yin, 2013) Studies establishing causal relationships between variables can be identified by as an explanatory study. The key component of the explanatory research is the identification of a problem or situation to clarify the relations between variables and quantitative data collection and analysis (Saunders et al., 2009). However, according to Robson (2002) the exploratory research represents an important way of exploring what is happening, searching for new insights, challenging and analyzing new phenomena. It is particularly helpful if the researcher has to clarify his/her problem



description so that the essence of a specific circumstance or problem can be found exactly (Saunders et al., 2009). The descriptive research is the extension or predecessor of an explanatory study (Saunders et al., 2009) which focused on profiling of persons, events or situations (Robson, 2002). It also provides a brief description of the phenomenon on which the researcher wants to collect information on the analysis. It must be emphasized that in pursuance of a research, the research design could be in the form of explanatory, exploratory or descriptive or even combination of any of the stated research design depending on the type of problem involved and the objective of the study. The explanatory research design was used in pursuance of this study on the influences of Process and Supplier Capability, collaboration in new product development on competitive advantage and the moderating effect of Research and Development capability and to assist derive the much-needed data from the field of survey in attainment of the objectives of the study.

### **3.2 Research Approach**

A research methodology requires the use of appropriate approaches to obtain the necessary data for the intended analysis. It focuses on the analysis methods used to handle data collection, data processing and processes for interpretation. The emphasis is usually on how to address the research questions or how the analysis will achieve its goals. Approaches to research studies are categorized into qualitative, quantitative and mixed process of qualitative and quantitative methods. There are many factors to be considered when deciding on the best method to be pursued for a report in terms of the scope of the research problem, the purpose of the project, the availability of resources such as time and money, the sensitivity of the subject, discipline and personal experience and the researcher's skills, interests and attitudes (Creswell, 2003; Grover, 2015).

The qualitative approaches involve the use of images and words. This approach is applicable in studies such as ethnography, theory, case studies, and phenomenology and narrative studies. It is often focused on the subjective understanding of research in relation to the phenomena studied. On the other hand, the quantitative method involves using numerical data and measurements and typically involved surveys and experimental studies. The quantitative research approach is mostly associated with a



questionnaire data collection technique that could lead to the adoption of statistical methods such as graphs or inferential statistics during data analysis. In this context, surveys are used to collect data through questionnaires or structured interviews (Saunders et al., 2009; Grover, 2015).

However, the essence of the research being pursued quite often drives the approach to be adopted in order to achieve relevant findings. In relation to that, the researcher could also decide whether the research strategy for the study could either be experimentation, survey, grounded theory or case studies to assist on how to plan the study to address the research questions and also how to apply the approach to obtain relevant data for the study (Johannesson and Perjons, 2014). In the strategy for studies, while the experimental research is normally used in the natural sciences to discover hidden facts, survey is used mostly in deductive studies for asking who, why, where and how statements or questions. Survey are commonly used in exploratory and explanatory studies as it allows for collection of huge quantities of data from a large population in a highly economical way.

Again, while the grounded studies are quite often used in developing and constructing theory, predicting and understanding certain behaviors, the case study research is used to comprehend real life situations. It is used to obtain empirical data of particular contemporary phenomenon in its natural settings. Case studies are associated with exploratory and explanatory analysis and quite often in descriptive studies to assist incorporates a range of methods of data collection to achieve the goals of the research (Goulding, 2002; Saunders et al., 2009; Yik, 2013). It must be emphasized that this particular study opted for survey strategy to assist collect enough numerical data that has the capacity to help achieve the objectives of the study that focused in examining the relationships between the variables of Process and Supplier Capability on collaboration in new product development on competitive advantage and Research and Development capability acting as the moderating between the variables.

### **3.3 Population of the Study**

The targeted population of the study comprises small and medium scale Enterprises (SMEs) within the Western Region of Ghana. The study adopted SMEs to assist in their Process and Supplier Capability on collaboration in new product development

competitive advantage and how Research and Development capability has played critical role or otherwise in their operations. In relation to this, the study's population consists of 500 SMEs in the Takoradi Metropolis. Because of the enormous number of SMEs in the Western Region (Takoradi Metropolis) with a high population of employees and base on the nature of the study, data was collected via non-probability sampling. To be called a non-probability sample, a participant must be chosen base on the purpose of the study. 500 SMEs in the Takoradi Metropolis were chosen using a basic random selection method from the list of SMEs who registered with the University of Mines and Technology (UMaT) business incubation hub. The employees of these firms were selected for the purpose of analyzing the SMEs Process and Supplier Capability, competitive advantage, collaboration in new product development as well as Research and Development. The researchers 'aim was to ascertain the respondent's interpretation of the relationship with the above-mentioned variables. From the field work undertaken. The employees needed for the study comprise Top management (Chief Executive Officers (CEOs), Managing Directors and Departmental / Unit Heads. The total number of CEOs, MDs and the departmental heads were selected based on the information provided to the UMaT business incubation hub. The population of the study is shown in the Table 3.1 below:

**Table 3.1: The Population of the Study**

S/N	Small and Medium scale Enterprise	Population
1.	Top management (CEOs)	100
2.	Managing Directors	150
3.	Departmental/Unit Heads	250
<b>Total</b>		<b>500</b>

Source: Fieldwork, 2022

### **3.4 Sampling Techniques and Sample Size**

A sample is identified as a representative of the main targeted population to assist provide the requisite data from the field of study to answer the study questions. Sample

size is essential in research study as researchers are not likely to cover the entire population during the research study. The selected size becomes the focus in the provision of the appropriate data on the study represent the target population. The sample size offers the study the ability to assess the ideas and behavior of the research population accurately.

The convenience and purposive sampling techniques were used to select the respondents from the targeted population made up of the top managers of the selected firms. This form of sampling technique was chosen to give everyone equal opportunity to take part in the study to assist respond to research questions on the relationships between the study of variables of Process and Supplier Capability on collaboration in new product development on competitive advantage and the moderating effect of Research and Development capability. In the quest of the researcher to derive the sample size of the study, the Yamane (1967) formula as cited by Boonying (2017) in pursuance of his study, was utilized. The Yamane (1967) sample size determination formula from population at the confidence level of 95%, where  $P = 0.05$  ( $e = 5\%$ ) was adopted for this study to help easily calculate a representative from the population of the study for the administration data collection instruments. The formula is presented below:

$$n = N / [1 + N(e)]^2$$

Where  $N$  = the population size,

$n$  = sample size

$e$  = level of precision or the margin of error

$$n = 500 / [1 + 500(0.05)]^2$$

$$n = 500 / (1 + 500) (0.05)^2$$

$$n = 500 / (1 + 500) (0.0025) = 250$$

From the above calculation, the sample size of the study stands at 250. Hence, 250 respondents would be chosen for the data collection exercise.

### **3.5 Data Collection Method**

A closed-ended questionnaire was used in this study to collect numerical data. The questionnaire was selected to make sure the respondents were more anonymous as part of the data collection exercise and also to assist them provide their responses objectively. Questionnaire as a technique for collecting a numerical is usually pre-ordered to assist respondents provided the needed responses on the objectives of the study. This research chose a standardized questionnaire which focused on the study goals and which the researcher self-administered to the respondents selected in the premises of their companies. In order to obtain the requisite data for the study, the researcher sought permission from the authorities of the studied firms and upon it was granted, explained the value of the study to the staff through the Top Managers of the firms. A volunteer assisted the researcher in the data collection exercise due to time constraints towards the completion of the study. The volunteer assisted in the collation of the data after the questionnaire were given out and administered to the respondents at the premises of the firms. The questionnaire given out to collect data were 250.

It must be added that the questionnaire administered to the respondents comprises a 5-point Likert Scale questions items ranging from 1- strongly disagree through 5- strongly agreed. This was done to encourage easy administration and collection of essential data for the study. The questionnaire consists of six sections with Section (I) on the respondents' background, Section (II) on Supplier Capabilities, Section (III) on collaboration in new product development, Section (IV) on competitive advantage, Section (V) focusing on Process Capabilities and then Section (VI) also focused on Research and Development Capabilities (R&D).

#### **3.5.1 Data Collection Instrument**

The data research instrument to be used for this study is questionnaire. Research instrument are essential tools to research in obtaining information that are important to the research (Wilkinson and Birmingham, 2003)



**Table 3.2 Data collection instrument**

<b>Constructs</b>	<b>Number of items</b>	<b>Source</b>
Process Capabilities	8	(Oh and Rhee,2008;Chan,2019)
Supplier Capabilities	8	(Squire el at.,2009;Habibollah,2011)
Collaboration in new product development	8	(Parker,2000; Chen ,2019; Tsai,2011)
Competitive Advantage	7	(Johannes el at.,2021; Salunkea,2019)
Research and Development Capabilities	5	(Ebrahim et al.,2009; Finstorp,2016)

Source: Fieldwork, 2022

### **3.6 Source of Data**

Sources of data are the methods through which data is gathered or collected and analysed (Bailey, 2018). Bailey (2018) further argues that, there are two main types of sources of data, namely; primary and secondary sources of data. A primary source or a secondary source might be used to gather information for a study (Mesly, 2015). However, this study relied on primary source of data because questionnaires were adopted from an existing literature.

### **3.7 Data Analysis**

Data analysis focused on the techniques used to analyze data collection variables used for the studies. In the data analysis of the data collected from the field of study, techniques to be adopted comprise tabulation, analysis of quantitative data or qualitative theme analysis. This process is carried out to provide the summarization of data collected in order to resolve the concerns of the research in a number of closely related activities. The analysis of data in this study was however pursued descriptively through statistical tools in the form of Mean and Standard Deviation and then the use of the Pearson Correlation and Multiple Hierarchical Regression from SPSS to examine the relationship between the variables as well as the moderation effect of collaboration in new product development on the associated variables.

### **3.8 Reliability and Validity**

The credibility of research findings which demonstrate whether research is viable and credible hinges on the reliability and validity. Reliability depends on achieving reliable findings from data collection methods or research procedures. Reliability meant that the questionnaire was consistent and precise devoid of any form of ambiguity to help respondents provide the needed data as accurately as possible without any deviation. This means that the answers to the questions provided by the respondents should easily help the researcher to make interpretation and conclusion on the findings (Dahl and Eisenso, 2007; Saunders et al., 2009).

The validity and the reliability of this study on the data collection instrument was pursued by the used of the Confirmatory Factor Analysis (CFA) and the Cronbach Alpha. Cronbach Alpha. The Cronbach Alpha is commonly used to evaluate test item in the determination of the reliability of the test instrument. In determination of the reliability of test items or indicators in the questionnaires, a 0 to 1 alpha score of Cronbach indicates reliability. However, and more generally, indicators with the values of 0.7 or higher scores are generally considered reliable are therefore allow to be remained in the data collection instruments (Hair et al., 2010).

### **3.9 Ethical Consideration**

In social science studies, research ethics is important due to personality and profile of the respondents involved in the study. In view of this, the ethical consideration regarding this research has been verified by the use of the ethical consideration of the KNUST Graduate School to achieve a high reaction rate. The researcher told the participants of the purpose and involvement of the study that is also voluntary but very necessary to help achieve the study goals. Instead of using the respondent's name to safeguard their confidentiality, the respondents were assured of confidentiality and anonymity, and thus the completed questionnaires collected from the various respondents were coded without their names added. The researcher also informed the respondents of their roles in the study and what was expected of them to help contribute meaningfully to the study objectives. Again, they were informed that the study's outcome was for academic purposes alone and not any other concealed motives behind.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND DISCUSSION

#### 4.0 Introduction

The chapter of the study presents the data analysis and discussions of the results in line with the objectives of the study. The study first touched on demographics of the respondents where the respondents gender, age, years of working experience and educational backgrounds were considered. The study then measured the validity and the reliability of the constructs used for the study. Descriptive statistics results for the variables were also considered. The inferential statistics using of structural equation model was carried. The chapter finally presents the summary of findings and discussion of the results. In all, 250 questionnaires were administered to 250 respondents in which 249 representing 99.6% was retrieved within the time frame.

**Table 4.1 Respondents Demographics**

Profile	Characteristics	Frequency	Percentage
<b>Gender</b>	Male	119	47.8
	Female	130	52.2
	Total	249	100
<b>Age</b>	20-25 years	23	9.2
	26-29 years	46	18.5
	30-35 years	68	27.3
	36- 49 years	58	23.3
	50-55 years	44	17.7
	56 - 60 years	10	4.0
	Total	249	100
<b>Years of working in organizations</b>	Less than 5 years	40	16.1
	5-10 years	91	36.5
	10-15 years	39	15.7
	15 years and above	79	31.7
	Total	249	100
<b>Level of education</b>	HND/Diploma	56	22.5
	Bachelor Degree	92	36.9
	Post-graduate	70	28.1
	PhD	31	12.4
	Total	249	100

Source: Field Data, 2022

The findings of the study revealed that 119 of the respondents were male representing 47.8% whereas 130 of the respondents were female representing 52.2%. This shows that the study considered gender balanced.

The age category, 23 of the respondents were within the 20-25 years of age representing 9.2%, 46 of the respondents were within 26-29 years of age representing 18.5%, 68 of the respondents were within 30-35 years of age representing 27.3%, 58 of the respondents were within 36-49 years of age representing 23.3%, 44 of the respondents were within 50-55 years of age representing 17.7% and 10 of the respondents were representing 4.0% years of working in organizations 40 of the respondents representing 16.1% have Less than 5 years working experience in their organizations. 91 of the respondents were of the respondents representing 36.5% have worked for about 5-10 years in their organizations. 39 of the respondents representing 15.7% have worked in their organizations for about 10-15 years and 79 of the respondents representing 31.7% have worked in their organizations for 15 years and above. The Level of education category, 56 of the respondents representing 22.5% were Higher National Diploma and Diploma graduate. 92 of the respondents representing 36.9% were first degree graduate. 70 of the respondents representing 28.1% were second degree-graduate. 31 of the respondents representing 12.4% were doctor of philosophy graduate.

#### **4.1 Reliability and Validity Tests**

One of the main requirements of any research process is the reliability of the data and findings. In the main, reliability deals with the consistency, dependability and replicable of “the results obtained from a piece of research” (Nunan, 1999, p. 14). Obtaining the similar results in quantitative research is rather straightforward because the data are in numerical form. To this end, Lincoln and Guba (1985, p. 288) point out that instead of obtaining the same results, it is better to think about the dependability and consistency of the data. In this case, the purpose is not to attain the same results rather to agree that based on the data collection processes the findings and results are consistent and dependable. For analysis of the internal reliability of the factors in the questions on supplier capability, collaboration in new product development, competitive advantage, process capability, and research and development capabilities Cronbach’s alpha values were tested (Kolbehndori & Sobhiyah, 2014: p.347; Wahab et al., 2010: p.67). Tavakol



& Dennick (2011: p.54-55) and Yount (2006) suggested that the acceptable values of Cronbach's alpha would range from 0.70 to 0.95. In the current study, a cut-off value of 0.70 was adopted. Furthermore, the optimal inter-item correlations mean (factor loadings) should range from 0.2 to 0.4, in order for the factor to be reliable (Pallant, 2013: p.134). However, in this study, a value of 0.3 and above was adopted. To confirm whether the data from the measurements was sufficient for factor analysis (test the validity), the Kaiser-Meyer-Olkin (KMO) test (Lorenzo-Seva et al., 2011) and the Bartlett's sphericity test (Hair et al., 2006: p.110) were performed. In the KMO test, as the values of the test vary from 0 to 1, values above 0.7 are recommended as being desirable for applying EFA (Hair et al., 2006) and a statistically significant Bartlett test ( $p < 0.05$ ) indicates that sufficient correlations exist between the variables to continue with the analysis (Hair et al., 2006: 110; Pallant, 2013: 190). For factor extraction, Principal Components Analysis (PCA) was used to summarise most of the information into a minimum number of factors, by concentrating the explanatory power on the first factor (find the principal components of data) (Rossoni et al., 2016: 102). In PCA, when the number of variables (measures) is between 20 and 50, it is more reliable to use Eigenvalues to extract factors, as it makes interpretation simpler (Johnson & Wichern, 2007). The highest Eigenvalues in the data is, therefore, the principal components in the data, which are retained to form a set of few new variables (less than the original variables started with in the analysis). In the present study, in order to guard against threats to internal reliability, the researcher has used the Cronbach's Alpha and Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity Approx. Chi-Square. The table 4.2 presents the reliability results.

**Table 4.2 Exploratory Factor Analysis for Supplier Capabilities**

Kaiser-Meyer-Olkin Measure of Sampling Ade Value = .930		Bartlett's Test of Sphericity sig Value = .000	
Approx. Chi-Square Value = 1643.030		Cronbach's Alpha = .944	
Eigen % of Variance = 71.863		Number of items = 8	
Item	Measure	Cronbach level after deletion	Factor loadings
SC1	We have a strong capability to integrate various suppliers into one.	.936	.732
SC2	We have a strong capability to coordinate with key suppliers.	.939	.657
SC3	My firms share resources to help suppliers improve capabilities and innovation	.936	.713
SC4	We have a strong technological capability for utilizing electronic devices.	.938	.682
SC5	It is easy to investigate quality problems in the organization.	.936	.726
SC6	We are involved in the design stage for new product development	.934	.757
SC7	We collaborate in developing new products.	.937	.705
SC8	We have good capability to acquire materials for new products.	.933	.777

**Source: Field Data, 2022**

The measurement of the supplier capability practice, the result posited that Cronbach's alpha was greater than 0.70 at .944, indicating acceptable internal reliability as recommended by Hair et al. (2006). The Kaiser – Meyer - Olkin (KMO) of .930 with Bartlett's Test of Sphericity of  $p < 0.000$ , indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of  $p < 0.05$ , as suggested by Pallant (2013:190). These results suggest that factor analysis could be conducted with the data. The eight measures (SC1, SC2, SC3, SC4, SC5, SC6, SC7, and SC8) expected

to define the supplier capability practice attained factor loadings of (.732, .657, .713, .682, .726, .757, .705, and .777) as reported in the table 4.2. These were greater than recommended value of 0.40 as suggested by Hair et al. (2006) and Pallant (2013). An Eigenvalue greater than 5.479 was established in this factor; this explained 71.863% of the variance in the data and Approx. Chi-Square Value = 1643.030.

**Table 4.2.1 Exploratory Factor Analysis for Collaboration in New Product Development**

Kaiser-Meyer-Olkin Measure of Sampling Ade Value =.903		Bartlett's Test of Sphericity sig Value = .000	
Approx. Chi-Square Value = 1508.295		Cronbach's Alpha=.935	
Eigen % of Variance = 69.140		Number of items = 8	
Item	Measure	Cronbach level after deletion	Factor loadings
CNPD1	There is high level of participation of inter-organizational in the process of new product development.	.930	.651
CNPD2	My organization collaborates with other departments by sharing relevant information in order to meet all needs.	.930	.635
CNPD3	My organization helps suppliers with improving their process to better meet my organization's needs.	.927	.676
CNPD4	By collaborating with suppliers, the speed of ordering system to procure materials have improved significantly.	.927	.694
CNPD5	Through organizational collaboration, there has been continuous improvement in efficient and effective use of resources.	.925	.735

CNPD6	Through collaboration, my organization involves key suppliers in continuous improvement programs thereby enhancing performance.	.925	.727
CNPD7	My organization has the capability to enhance productivity consistently through resources collaboration.	.924	.737
CNPD8	Collaboration among design, development, and marketing and production department is active.	.928	.676

**Source: Field Data, 2022**

The measurement of the Collaboration in New Product Development practice, the result posited that Cronbach's alpha was greater than 0.70 at .935, indicating acceptable internal reliability as recommended by Hair et al. (2006). The Kaiser – Meyer - Olkin (KMO) of .903 with Bartlett's Test of Sphericity of  $p < 0.000$ , indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of  $p < 0.05$ , as suggested by Pallant (2013:190). These results suggest that factor analysis could be conducted with the data. The eight measures (CNPD1, CNPD2, CNPD3, CNPD4, CNPD5, CNPD6, CNPD7 and CNPD8) expected to define the Collaboration in New Product Development practice attained factor loadings of (.651,.635, .676,.694, .735,.727, .737 and .676) as reported in the table 4.2. These were greater than recommended value of 0.40 as suggested by Hair et al. (2006) and Pallant (2013). An Eigenvalue greater than 5.531 was established in this factor; this explained 69.140% of the variance in the data and Approx. Chi-Square Value = 1508.295.

**Table 4.2.2 Exploratory Factor Analysis for Competitive Advantage**

Kaiser-Meyer-Olkin Measure of Sampling Ade Value = .920	Bartlett's Test of Sphericity sig Value = .000
Approx. Chi-Square Value = 1329.426	Cronbach's Alpha=.935
Eigen % of Variance = 72.168	Number of items = 7



Item	Measure	Cronbach level after deletion	Factor loadings
CA1	Our delivery time is fast.	.926	.715
CA2	Our delivery compliance is high.	.927	.697
CA3	We reduce cost through process innovation.	.921	.776
CA4	We are highly capable of responding to pressing orders.	.924	.731
CA5	Our degree of design modification is low.	.926	.708
CA6	Small and Medium Enterprises can increase cost competitiveness with our help	.927	.689
CA7	Small and Medium Enterprises can increase quality competitiveness of a new product development with our help.	.924	.736

**Source: Field Data, 2022**

The measurement of the Competitive Advantage practice, the result posited that Cronbach's alpha was greater than 0.70 at .935, indicating acceptable internal reliability as recommended by Hair et al. (2006). The Kaiser – Meyer - Olkin (KMO) of .920 with Bartlett's Test of Sphericity of  $p < 0.000$ , indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of  $p < 0.05$ , as suggested by Pallant (2013:190). These results suggest that factor analysis could be conducted with the data. The eight measures (CA1, CA2, CA3, CA4, CA5, CA6 and CA7) expected to define the Competitive Advantage practice attained factor loadings of (.715, .697, .776, .731, .708, .689 and .736) as reported in the table 4.2. These were greater than recommended value of 0.40 as suggested by Hair et al. (2006) and Pallant (2013). An Eigenvalue greater than 5.052 was established in this factor; this explained 72.168% of the variance in the data and Approx. Chi-Square Value = 1329.426.

**Table 4.2.3 Exploratory Factor Analysis for Process Capabilities**

Kaiser-Meyer-Olkin Measure of Sampling Ade Value =.924		Bartlett's Test of Sphericity sig Value = .000	
Approx. Chi-Square Value = 1442.556		Cronbach's Alpha=.934	
Eigen % of Variance = 68.462		Number of items = 8	
Item	Measure	Cronbach level after deletion	Factor loadings
PC1	Production cycle time is short.	.923	.719
PC2	Market cycle time of new product is short.	.924	.697
PC3	Product returning rate is low.	.925	.678
PC4	Inventory expense is low.	.924	.693
PC5	Frequency of re-work resulting is quality failure is low	.925	.673
PC6	My organization aims at eliminating waste	.924	.707
PC7	My organization trains its staff which bring them up to speed	.928	.634
PC8	We conduct quality engineering to cut down cost	.925	.674

**Source: Field Data, 2022**

The measurement of the Process Capabilities practice, the result posited that Cronbach's alpha was greater than 0.70 at .934, indicating acceptable internal reliability as recommended by Hair et al. (2006). The Kaiser – Meyer - Olkin (KMO) of .924 with Bartlett's Test of Sphericity of  $p < 0.000$ , indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of  $p < 0.05$ , as suggested by Pallant (2013:190). These results suggest that factor analysis could be conducted with the data. The eight measures (PC1, PC2, PC3, PC4, PC5, PC6, PC7 and PC8) expected to define the Process Capabilities practice attained factor loadings of (.719, .697, .678, .693, .673, .707, .634 and .674) as reported in the table 4.2. These were greater than recommended value of 0.40 as suggested by Hair et al. (2006) and Pallant (2013). An

Eigenvalue greater than 5.052 was established in this factor; this explained 72.168% of the variance in the data and Approx. Chi-Square Value = 1442.556.

Table 4.2.4 Exploratory Factor Analysis for Research and Development (R&D) Capabilities

Kaiser-Meyer-Olkin Measure of Sampling Ade Value =.859		Bartlett's Test of Sphericity sig Value = .000	
Approx. Chi-Square Value = 773.145		Cronbach's Alpha=.939	
Eigen % of Variance = 82.209		Number of items = 5	
Item	Measure	Cronbach level after deletion	Factor loadings
RDC1	Developing new ideas to help new product development.	.924	.834
RDC2	Able to fast track new product development.	.928	.810
RDC3	R&D helps to differentiate products and enjoy cost-wise advantage	.922	.828
RDC4	My organization enables the development of new product and utilizes new process.	.924	.816
RDC5	Research on R&D within our firm examines a range of issues from different theoretical perspectives.	.927	.811

Source: Field Data, 2022

The measurement of the Process Capabilities practice, the result posited that Cronbach's alpha was greater than 0.70 at .939, indicating acceptable internal reliability as recommended by Hair et al. (2006). The Kaiser – Meyer - Olkin (KMO) of .859 with Bartlett's Test of Sphericity of  $p < 0.000$ , indicating consistency with the recommended KMO cut off value of 0.60 and Bartlett's Test of Sphericity of  $p < 0.05$ , as suggested by

Pallant (2013:190). These results suggest that factor analysis could be conducted with the data. The eight measures (RDC1, RDC2, RDC3, RDC4 and RDC5) expected to define the Process Capabilities practice attained factor loadings of (.834, .810, .828, .816 and .811) as reported in the table 4.2. These were greater than recommended value of 0.40 as suggested by Hair et al. (2006) and Pallant (2013). An Eigenvalue greater than 3.288 was established in this factor; this explained 82.209% of the variance in the data and Approx. Chi-Square Value = 773.145.

#### **4.2 Confirmatory Factor Analysis for the constructs**

Construct validity requires a definition with clearly specified conceptual boundaries (Newman, 2002) and concerned with the underlying attributes rather than with the scores the instrument produces (Salkind, 2000). The validation emphasizes a logical analysis and tests the relationships predicated based on theoretical considerations. Convergent validity is a method to test construct validity. The word of construct shows a theoretical viewpoint to explain some phenomenon (Wiersma, 2000). According to (Van Dalen, 1973) states that construct usually refers to a complex concept which includes several interrelated factors. In this study, convergent validity was assessed by factor loading, Composite Reliability (CR) and Average Variance Extracted (AVE) (Fornell & Larcker, 1981).

Confirmatory Factor Analysis (CFA) is conducted to estimate factor loading of variables. In fact, a factor loading presents the level of a regression path from a latent to its indicators. According to (Hair et al., 2010), an acceptable factor loading value is more than 0.5 and when it is equal to 0.7 and above it is considered good for one indicator therefore items with factor loading more than 0.5 and above are considered for the validity test of this study. The level of CR is another guideline to review convergent validity. Although Cronbach's alpha is a very popular coefficient to test reliability (Bollen & Long, 1993) and (Garson, 2011). According to (Hair et al., 2010), the acceptable value of Composite Reliability is 0.7 and above. The table 4.3 presents the Convergent, Discriminant and composite Reliability tests.



**Table 4.3 Convergent, Discriminant and Composite Reliability Tests**

Construct	AVE	DV	CR
Supplier Capability	0.541	0.735	0.734
Collaboration in New Product Development	0.538	0.734	0.853
Process Capabilities	0.537	0.733	0.776
Competitive Advantage	0.508	0.713	0.774
Research and Development (R&D)	0.672	0.819	0.9111

**Source: Field Data, 2022**

Haire et al. (2019) recommended that an Average Variance Extracted (AVE) as convergent validity measure since AVE could explain the degree to which items are shared between the construct in Structural Equation Modeling (SEM) where AVE 0.5 or more are acceptable as convergent validity. Supplier Capability with an Average Variance Extracted value of 0.541 is within the threshold of 0.5. Collaboration in New Product Development with an Average Variance Extracted value of is within the recommended threshold 0.538. Process Capabilities with an Average Variance Extracted value of 0.537 is within the recommended threshold Competitive Advantage with an Average Variance Extracted value of 0.508 is within the recommended threshold. Research and Development (R&D) with an Average Variance Extracted value of 0.672 is within the recommended threshold. Hair et al. (2010), the acceptable value of Composite Reliability is 0.7 and above. Supplier Capability Composite Reliability value of 0.734 is within the recommended the threshold stated by recommended by Hair et al. (2010). Collaboration in New Product Development Capability Composite Reliability value of 0.853 is within the recommended the threshold stated by recommended by Hair et al. (2010). Process Capabilities Capability Composite Reliability value of 0.776 is within the recommended the threshold stated by recommended by Hair et al. (2010). Competitive Advantage Capability Composite Reliability value of 0.774 is within the recommended the threshold stated by recommended by Hair et al. (2010). Research and Development (R&D) Capability Composite Reliability value of 0.9111 is within the threshold recommended by Hair et al. (2010).

**Table 4.4 Correlations: (among the variables)**

			Estimate
CNPD	<-->	PC	.046
CA	<-->	CNPD	.818
SC	<-->	CA	.700
SC	<-->	RDC	.295
PC	<-->	RDC	.808
SC	<-->	PC	.380
SC	<-->	CNPD	.677

**Note:** Collaboration in New Product Development (CNPD), Competitive Advantage (CA), Supplier Capabilities (SC), Process Capabilities (PC), Research and Development Capabilities (RDC)

**Source:** Field Data, 2022

Haire et al. (2019) stated that discriminant validity could be established by correlating one construct to another. If the correlation value of both constructs is lower than 0.85, it means that the discriminant validity exists. The correlation table estimate figures are all less than 0.85 to confirm that discriminant validity exists.

#### 4.3 Model Fit Summary

##### CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	49	577.779	182	.000	3.175
Saturated model	231	.000	0		
Independence model	21	4939.055	210	.000	23.519

##### RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.324	.841	.798	.663
Saturated model	.000	1.000		
Independence model	.698	.123	.035	.111

##### Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.883	.865	.917	.903	.916
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

##### Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.867	.765	.794
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

#### NCP

Model	NCP	LO 90	HI 90
Default model	395.779	326.965	472.204
Saturated model	.000	.000	.000
Independence model	4729.055	4503.864	4961.497

#### FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.330	1.596	1.318	1.904
Saturated model	.000	.000	.000	.000
Independence model	19.916	19.069	18.161	20.006

#### RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.094	.085	.102	.000
Independence model	.301	.294	.309	.000

#### AIC

Model	AIC	BCC	BIC	CAIC
Default model	675.779	685.319	848.134	897.134
Saturated model	462.000	506.973	1274.532	1505.532
Independence model	4981.055	4985.144	5054.922	5075.922

#### ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.725	2.447	3.033	2.763
Saturated model	1.863	1.863	1.863	2.044
Independence model	20.085	19.177	21.022	20.101

#### HOELTER

Model	HOELTER .05	HOELTER .01
Default model	93	99
Independence model	13	14

The model fit was also deemed necessary for further confirmation of the initial validity and reliability tests. The table 4.5 presents the results.

**Source: Field Data, 2022**

The study also considered the model fit summary after the validity and reliability have been well established. The  $CFI = .916$ ;  $TLI = .903$ ;  $IFI = .917$ ;  $RFI = .865$  and  $NFI = .883$  had values exceeding 0.09 cutoff (Hair et al., 1998). The  $RMSEA = .094$  was within the acceptable recommended value ranging proposed by (Hair et al., 1998). The results of the alternatives indices provided evidence of the overall validity of the hypothesized model.

#### **4.4 Supplier Capability Performance**

The study examined supplier capability performance of the Small and Medium Enterprises used for the study. In doing this, 8 items were selected and the table 4.5 presents the descriptive statistics.





**Table 4.5 Descriptive Statistics Results for Supplier Capability Performance**

Items	Min	Max	Mean	S. D
We have a strong capability to integrate various suppliers into one.	1.0	5.0	4.036	1.2291
We have a strong capability to coordinate with key suppliers.	1.0	5.0	3.948	1.0707
My firms share resources to help suppliers improve capabilities and innovation	1.0	5.0	3.871	1.1286
We have a strong technological capability for utilizing electronic devices.	1.0	5.0	3.871	1.1393
It is easy to investigate quality problems in the organization.	1.0	5.0	3.839	1.1702
We are involved in the design stage for new product development	1.0	5.0	3.896	1.1765
We collaborate in developing new products.	1.0	5.0	3.952	1.0951
We have good capability to acquire materials for new products.	1.0	5.0	3.952	1.0951

**Source: Field Data, 2022**

*Scale: 1 strongly disagree, 2 disagree, 3neutral, 4 agree, 5 strongly agree*

The mean= 4.036 and standard deviation=1.2291 indicate respondent agreement that the SMEs have a strong capability to integrate various suppliers into one. The mean=3.948 and standard deviation= 1.0707 indicate respondent uncertainty as to whether the SMEs have a strong capability to coordinate with key suppliers or not. The mean= 3.871 and standard deviation= 1.1286 is indicate respondent uncertainty as to whether the firms have share resources to help suppliers improve capabilities and innovation or not. The mean=3.871 and standard deviation= 1.1393 indicate respondent uncertainty as to whether the firms have a strong technological capability for utilizing electronic devices or not. The mean=3.839 and standard deviation= 1.1702 indicate respondent uncertainty as to whether it is easy to investigate quality problems in their organizations or not. The mean=3.896 and standard deviation= 1.1765 indicate respondent uncertainty as to whether they are highly involved in the design stage for new product development or not. The mean=3.952 and standard deviation=1.0951

indicate respondent uncertainty as to whether they are collaborating in developing new products or not. The mean=3.952 and standard deviation= 1.0951 indicate respondents' uncertainty as to whether they have good capability to acquire materials for new products or not.

#### 4.5 Collaboration in New Product Development Performance

The study examined collaboration in new product development performance of the Small and Medium Enterprises used for the study. In doing this, 8 items were selected and the table 4.6 presents the descriptive statistics.

**Table 4.6 Descriptive Statistics Results for Collaboration in New Product Development**

Items	Min	Max	Mean	S. D
There is high level of participation of inter-organizational in the process of new product development.	1.0	5.0	4.028	1.1961
My organization collaborates with other departments by sharing relevant information in order to meet all needs.	1.0	5.0	3.912	1.0121
My organization helps suppliers with improving their process to better meet my organization's needs.	1.0	5.0	3.968	1.0468
By collaborating with suppliers, the speed of ordering system to procure materials have improved significantly.	1.0	5.0	3.956	1.0288
Through organizational collaboration, there has been continuous improvement in efficient and effective use of resources.	1.0	5.0	3.996	1.0832
Through collaboration, my organization involves key suppliers in continuous improvement programs thereby enhancing performance.	1.0	5.0	3.928	1.0253
My organization has the capability to enhance productivity consistently through resources collaboration.	1.0	5.0	3.968	1.0621
Collaboration among design, development, and marketing and production department is active.	1.0	5.0	3.948	1.0127

*Scale: 1 strongly disagree, 2 disagree, 3neutral, 4 agree, 5 strongly agree*

The mean= 4.028 and standard deviation= 1.1961 indicate respondents' agreement that they have high level of participation of inter-organizational in the process of new product development. The mean= 3.912 and standard deviation= 1.0121 indicate respondents' uncertainty of their organizations collaboration with other departments by sharing relevant information in order to meet all needs. The mean= 3.968 and standard deviation= 1.0468 indicate respondents' uncertainty of their organizations helping suppliers with improving their process to better meet my organization's needs. The mean= 3.956 and standard deviation=1.0288 indicate respondents' uncertainty of their organizations collaborating with suppliers to achieve the speed of ordering system to procure materials have improved significantly. The mean= 3.996 and standard deviation=1.0832 indicate respondents' uncertainty of their organizations collaboration been continuous improvement in efficient and effective use of resources. The mean= 3.928 and standard deviation=1.0253 indicate respondents' uncertainty of their organizations collaboration, with key suppliers in continuous improvement programs thereby enhancing performance. The mean= 3.968 and standard deviation=1.0621 indicate respondents' uncertainty of their organizations having the capability to enhance productivity consistently through resources collaboration. The mean= 3.948 and standard deviation= 1.0127 indicate respondents' uncertainty of their organizations having collaboration among design, development, marketing and production department is active.

#### **4.6 Competitive Advantage Performance**

The study examined competitive advantage performance of the Small and Medium Enterprises used for the study. In doing this, 7 items were selected and the table 4.7 presents the descriptive statistics.

**Table 4.7 Descriptive Statistics Results for Competitive Advantage**

Items	Min	Max	Mean	S. D
Our delivery time is fast.	1.0	5.0	4.141	1.1779
Our delivery compliance is high.	1.0	5.0	3.932	1.1672
We reduce cost through process innovation.	1.0	5.0	3.948	1.0745

We are highly capable of responding to pressing orders.	1.0	5.0	3.956	1.0971
Our degree of design modification is low.	1.0	5.0	3.892	1.1676
Small and Medium Enterprises can increase cost competitiveness with our help	1.0	5.0	4.000	1.1072
Small and Medium Enterprises can increase quality competitiveness of a new product development with our help.	1.0	5.0	3.988	1.0530

*Scale: 1 strongly disagree, 2 disagree, 3neutral, 4 agree, 5 strongly agree*

The mean= 4.141 and standard deviation= 1.1779 indicate the respondent's agreement that their organization delivery time is fast. The mean= 3.932 and standard deviation=1.1672 indicate the respondent's uncertainty of their firm's delivery compliance been high or low. The mean= 3.948 and standard deviation= 1.0745 indicate the respondent's uncertainty of their firms reducing cost through process innovation. The mean= 3.956and standard deviation=1.0971 indicate the respondent's uncertainty of their firm's capability of responding to pressing orders. The mean= 3.892 and standard deviation=1.1676 indicate the respondent's uncertainty of their firm's degree of design modification is either low or high. The mean= 4.000 and standard deviation= 1.1072 indicate the respondent's agreement that their organization can increase cost competitiveness with the help of their suppliers. The mean=3.988 and standard deviation= 1.0530 indicate the respondent's uncertainty of their firms Small and Medium Enterprises increasing quality competitiveness of a new product development with the help of their suppliers.

#### **4.7 Process Capability Performance**

The study examined process capability performance of the Small and Medium Enterprises used for the study. In doing this, 8 items were selected and the table 4.8 presents the descriptive statistics.



**Table 4.8 Descriptive Statistics Results for Process Capability**

Items	Min	Max	Mean	S.D
Production cycle time is short.	1.0	5.0	4.012	1.1997
Market cycle time of new product is short.	1.0	5.0	3.888	1.1123
Product returning rate is low.	1.0	5.0	3.960	.9951
Inventory expense is low.	1.0	5.0	3.851	1.1492
Frequency of re-work resulting is quality failure is low	1.0	5.0	3.880	1.0895
My organization aims at eliminating waste	1.0	5.0	4.004	1.0568
My organization trains its staff which bring them up to speed	1.0	5.0	3.964	1.0094
We conduct quality engineering to cut down cost	1.0	5.0	4.000	1.0200

*Scale: 1 strongly disagree, 2 disagree, 3neutral, 4 agree, 5 strongly agree*

The mean= 4.012 and standard deviation=1.1997 indicate the respondent's agreement that their organization production cycle time is short. The mean=3.888 and standard deviation= 1.1123 indicate the respondent's uncertainty that their organization Market cycle time of new product is short. The mean= 3.960 and standard deviation= .9951 indicate the respondent's uncertainty that their organization product returning rate is low or high. The mean= 3.851 and standard deviation= 1.1492 indicate the respondent's uncertainty that their organization Inventory expense is low or high. The mean=3.880 and standard deviation=1.0895 indicate the respondent's uncertainty that their organization frequent re-work resulting is quality failure is low or high.

The mean= 4.004 and standard deviation=1.0568 indicate the respondent's agreement that their organizations aim at eliminating waste. The mean= 3.964 and standard deviation=1.0094 indicate the respondent's uncertainty that their organization trains the staff which bring them up to speed or not. The mean= 4.000 and standard deviation 1.0200 indicate the respondent's agreement that their organization conduct quality engineering to cut down cost.

#### **4.8 Research and Development Capability Performance**

The study examined research and development capability performance of the Small and Medium Enterprises used for the study. In doing this, 5 items were selected and the table 4.9 presents the descriptive statistics.



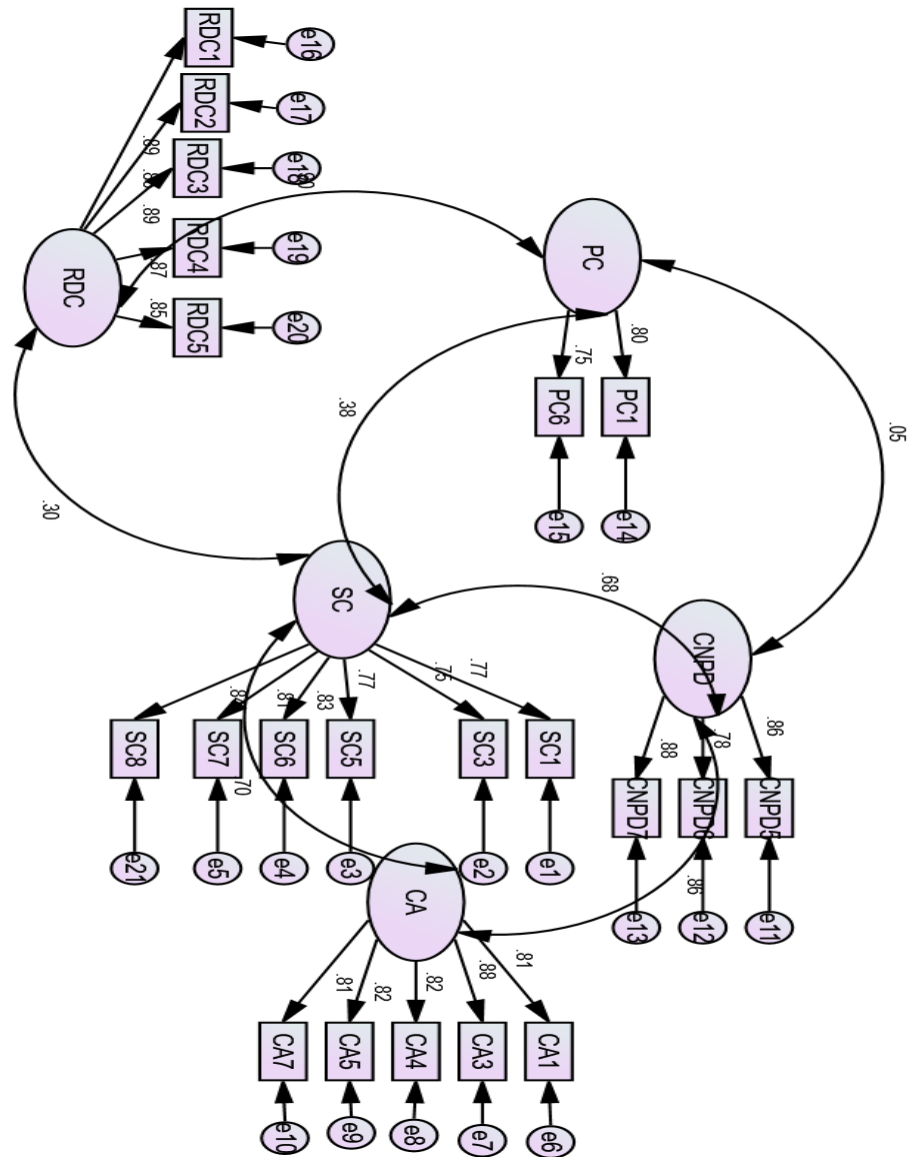
**Table 4.9 Descriptive Statistics Results for Research and Development Capability**

Items	Min	Max	Mean	S.D
Developing new ideas to help new product development.	1.0	5.0	4.225	1.1242
Able to fast track new product development.	1.0	5.0	4.080	1.0128
R&D helps to differentiate products and enjoy cost-wise advantage	1.0	5.0	4.044	1.1008
My organization enables the development of new product and utilize new process.	1.0	5.0	3.968	1.0659
Research on R&D within our firm examines a range of issues from different theoretical perspectives.	1.0	5.0	3.996	1.0219

*Scale: 1 strongly disagree, 2 disagree, 3neutral, 4 agree, 5 strongly agree*

The mean= 4.225 and standard deviation= 1.1242 indicate the respondents agreement that their organizations develop new ideas to help new product development. The mean= 4.080 and standard deviation=1.0128 indicate the respondents agreement that their organization are able to fast track new product development. The mean= 4.044and standard deviation=1.1008 indicate the respondents uncertainty that their organization research and development helps them to differentiate products and enjoy cost-wise advantage.

The mean= 3.968 and standard deviation= 1.0659 indicate the respondents uncertainty that their organization enables the development of new product and utilize new process. The mean= 3.996 and standard deviation=1.0219 indicate the respondents uncertainty that as to their organization research on research and development within their firms examines a range of issues from different theoretical perspectives or not.



**Figure 1 Covariance among the variables**

**Source: Field Data, 2022**

*PC= Process Capability, RDC= Research and Development Capability, SC= Supplier Capability, CNPD= Collaboration in New Product Development, CA= Competitive Advantage*



**Table 4. Covariances: (Default model)**

			Estimate	S.E.	C.R.	P	Label
CNPD	<-->	PC	.040	.028	1.415	.157	par_17
CA	<-->	CNPD	.751	.088	8.521	***	par_18
SC	<-->	CA	.571	.075	7.592	***	par_19
SC	<-->	RDC	.250	.048	5.162	***	par_20
PC	<-->	RDC	.847	.097	8.717	***	par_21
SC	<-->	PC	.307	.054	5.699	***	par_22
SC	<-->	CNPD	.527	.070	7.532	***	par_23

**Source: Field Data, 2022**

The relationship between collaboration in new product development and process capability (Estimate of =.040, S.E. = .028, C.R. 1.415,  $P < 0.157$ ) indicate a positive but insignificant relationship between collaboration in new product development and process capability.

The relationship between collaboration in new product development and competitive advantage, the (Estimate of =.751, S.E. = .088, C.R. 8.521,  $P < 0.000$ ) indicate a positive relationship and significant between collaboration in new product development and process capability.

The relationship between supplier capability and competitive advantage, the (Estimate of =.571, S.E. = .075, C.R. 7.592,  $P < 0.000$ ) indicate a positive and significant relationship between supplier capability and competitive advantage.

The relationship between supplier capability and research and development and capability, the (Estimate of =.250, S.E. = .048, C.R. 5.162,  $P < 0.000$ ) indicate a positive and significant relationship between supplier capability and research and development and capability.

The relationship between research and development capability and process capability, the (Estimate of =.847, S.E. = .097, C.R. 8.717,  $P < 0.000$ ) indicate a positive and significant relationship between development capability and process capability.

The relationship between supplier capability and process capability, the (Estimate of =.307, S.E. = .054, C.R. 5.699,  $P < 0.000$ ) indicate a positive and significant relationship between supplier capability and process capability.

The relationship between collaboration in new product development and supplier capability, the (Estimate of =.527, S.E. = .070, C.R. 7.532,  $P < 0.000$ ) indicate a

positive and significant relationship between collaboration in new product development and supplier capability.

#### 4.9 Hypothesis model for the study

The hypothesis model of the study was tested by using AMOS, version 26. The structural equation model was used to test the direct influence of the independent variables on the dependent variables as well as the moderating effect. The figure 4.2 presents the results.

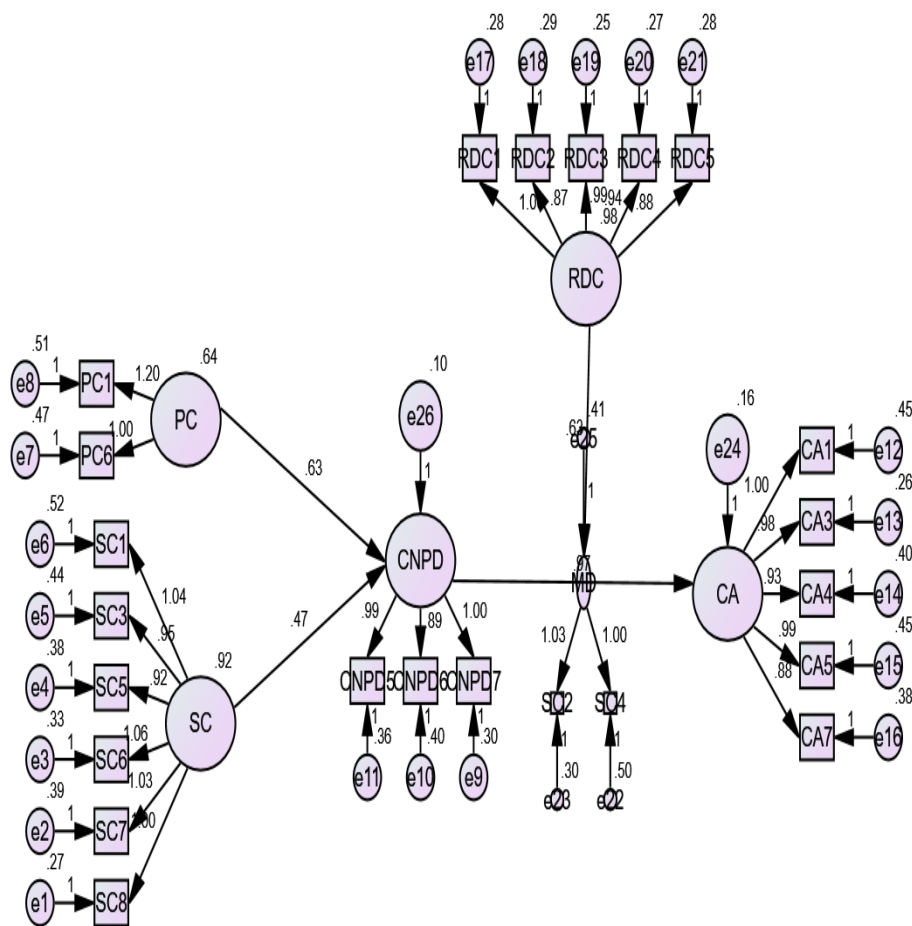


Figure 4.2 Hypothesis model for the study

Source: Field Data, 2022

**Table 4. Hypothesis Model Results**

Hypothesis	Estimate	S.E.	C.R.	P
PC---> CNPD	.447	.045	9.849	0.000
SC---> CNPD	.465	.043	10.893	0.000
CNPD--->CA	.412	.083	4.963	0.000
RDC - -> CNPD *CA	.966	.083	11.604	0.000

**Source: Field Data, 2022**

The influence of process capability on collaboration of new product development, the R Square indicates a total effect of 63%. Process capability is predicting collaboration of new product development of about 63%. The statistical (*Estimate value* = .477, *Standard Error value* = .045, *Critical Ratio value* = 9.849 and  $P < 0.000$ ) indicate that process capability has a positive and significant influence on collaboration of new product development.

The study examined the influence of supplier capability on collaboration of new product development and the R Square indicates a variation of 47%. Thus supplier capability can overall affect new product development of about 47%. The statistical (*Estimate value* = .465, *Standard Error value* = .043, *Critical Ratio value* = 10.893 and  $P < 0.000$ ) indicate that supplier capability has a positive and insignificant influence on collaboration of new product development.

The influence of collaboration of new product development on competitive advantage and the R Square indicates a variation of 41%. Thus, collaboration of new product development can overall affect competitive advantage of about 41%. The statistical (*Estimate value* = .412, *Standard Error value* = .083, *Critical Ratio value* = 4.963 and  $P < 0.000$ ) indicate that collaboration of new product development has a positive and significant influence on competitive advantage.

The study then considered the moderating effect of research and development capability on the relationship between collaboration in new product development and competitive advantage and the R Square indicates a variation of 65%. This explains that research development capability can overall moderate the relationship between collaboration in new product development and competitive advantage. The statistical (*Estimate value* = .966, *Standard Error value* = .083, *Critical Ratio value* = 11.604 and  $P < 0.000$ ) indicate that research and development capability positively and significantly

moderates the relationship between collaboration in new product development and competitive advantage.

#### 4.10 Hypothesis testing and findings

Hypothesis	Relationship	Beta value	T value	P<	Remarks
H1	PC---> CNPD	.447	9.849	0.000	Supported
H2	SC---> CNPD	.465	10.893	0.000	Supported
H3	CNPD--->CA	.412	4.963	0.000	Supported
H4	RDC - -> CNPD *CA	.966	11.604	0.000	Supported

Source: Field data, 2022

#### 4.11 Discussion of Results

The influence of process capability on collaboration of new product development, the R Square indicates a total effect of 63%. Process capability is predicting collaboration of new product development of about 63%. The statistical (*Estimate value = .477, Standard Error value = .045, Critical Ratio value = 9.849 and  $P < 0.000$* ) indicate that process capability has a positive and significant influence on collaboration of new product development.

The study examined the influence of supplier capability on collaboration of new product development and the R Square indicates a variation of 47%. Thus supplier capability can overall affect new product development of about 47%. The statistical (*Estimate value = -.465, Standard Error value = .043, Critical Ratio value = 10.893 and  $P < 0.000$* ) indicate that supplier capability has a positive and significant influence on collaboration of new product development.

The influence of collaboration of new product development on competitive advantage and the R Square indicates a variation of 41%. Thus, collaboration of new product development can overall affect competitive advantage of about 41%. The statistical (*Estimate value = .412, Standard Error value = .083, Critical Ratio value = 4.963 and  $P < 0.000$* ) indicate that collaboration of new product development has a positive and significant influence on competitive advantage.



The study then considered the moderating effect of research and development capability on the relationship between collaboration in new product development and competitive advantage and the R Square indicates a variation of 65%. This explains that research development capability can overall moderate the relationship between collaboration in new product development and competitive advantage. The statistical (*Estimate value* = .966, *Standard Error value* = .083, *Critical Ratio value* = 11.604 and  $P < 0.000$ ) indicate that research and development capability positively and significantly moderates the relationship between collaboration in new product development and competitive advantage.

The study examined the influence of process capability on collaboration of new product development and the findings of the study indicate that process capability has a positive and significant influence on collaboration of new product development. The supports from this group of stakeholders are seen within the firm in the form of value creation opportunities, “customer relationship experiences and new product development. Suppliers help the firm sense changes in customer needs and enhance information acquisition” (Kim et al., 2013), which helps cultivate the firm's learning capability. Also, “supplier relationships support the firm's ability to generate product innovations” (Johannes al., 2023; Maria and Alicia, 2017; Luiz and Patrícia, 2016). “Early collaborations with suppliers in the product development process support a firm with improved, integrative problem-solving capabilities” (Hultink et al., 2010; Mirkovski et al., 2023; Lieshout et al., 2021).

The study examined the influence of supplier capability on collaboration in new product development and the findings of the study indicate that supplier capability has a positive and significant influence on collaboration in new product development. Literature posits that Strong buyer-supplier collaboration in the design and development of major product components allows the project's buyer and supplier participants to freely communicate necessary information” (Lukas et al., 2012). Information exchange is also necessary for planning work schedules and ensuring that the process is followed in other to minimize unwanted gaps or overlaps in responsibilities (Erik et al., 2010). “When technical issues develop, the firm and supplier members must swiftly and completely inform one another of the new situation so that appropriate solutions can be sought jointly” (Erik et al., 2010; Michael et al., 2015). Both the company and the supplier members may have some technical specifications going into the project, like a general

product/part design or a basic technology. “The firm and supplier members will almost certainly need to comprehend each other's technical, budgetary, and organizational realities as well as adapt to and accommodate each other in a mutually supportive manner in order to ensure the highest integrity of the overall product (including the supplier's component)” (Michael et al., 2015). Firms can acquire insights into suppliers' capabilities and constraints (Huo, 2012), ultimately enabling more effective planning and forecasting, better product and process designs and reduced transaction costs (Zhang and Huo, 2013).

The influence of collaboration in new product development on competitive advantage, the statistical indicate that collaboration in new product development has a positive and significant influence on competitive advantage. Process capabilities related to competitive priorities are defined as process capabilities and subdivided into dependability improvement, cost reduction, quality improvement, and flexibility capabilities, according to previous operations strategy research (Sandeepet al., 2015; Kristen al., 2023). “Buyers assess and choose suppliers based on their capabilities, which include design, quality, dependability, and cost” (Chen,2019; Brito and Sauan, 2016).

The study finally assessed the moderating effect of research and development capability on the relationship between collaboration in new product development and competitive advantage and the findings of the study indicate that research and development positively and significantly moderate the relationship between collaboration in new product development and competitive advantage. Working with suppliers who are unable to study the business environment, bring new ideas and also handle technological challenges can quickly increase expenses, which is another risk of collaboration. As a result, there may be a technological threshold at which the collaboration's transaction-cost diseconomies outweigh its benefits and erode the enterprises' competitive edge. As a result, in the event of serious technological challenges, companies may choose to perform the duties that were originally delegated to the cooperation themselves or, conversely, to delegate those responsibilities wholly to suppliers. Regardless of whether a course is taken, as technical issues increase in frequency, supplier and company collaboration will decrease. Hongyun al. (2021) “backed up this claim, stating that when a company faces rising technological challenges, it often begins to develop pieces and components”. Manage similar

responsibilities within the company to reduce transaction costs. As a result, research and development ought to benefit an enterprise's ability to compete, but this effect ought to be constrained by technological uncertainty.

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## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

#### **5.0 Introduction**

This chapter of the study presents the summary of the findings, conclusion, managerial implications, theoretical implication recommendations and areas for future studies.

#### **5.1 Objective of the study**

The overall objective of the study is to investigate process and supplier capabilities on collaboration in new Product development and competitive advantage, with particular emphasis on the moderating effect of research and development capabilities. The specific objectives are;

1. To assess the influence of process capabilities on collaboration in new product development in small and medium scale enterprise
2. To examine the effect of supplier capabilities on collaboration in new product development
3. To determine the influence of collaboration in new product development on competitive advantage
4. To ascertain the moderating effect of Research and Development Capabilities on the relationship between collaboration in new product development and the competitive advantage

#### **5.2 Summary of findings**

##### **5.2.1 The influence of process capabilities on collaboration in new product development**

The study aimed to investigate the impact of process capabilities on collaboration in new product development. Through careful examination and analysis, the findings revealed a significant and positive influence of process capabilities on collaboration in new product development. This suggests that the effectiveness and efficiency of the processes employed during the development of new products have a crucial role in fostering collaboration among team members and stakeholders. When process



capabilities are well-developed and executed, they contribute to enhanced collaboration, leading to improved outcomes in new product development. Consequently, the study concluded that process capabilities have a significant and positive influence on collaboration in new product development.

### **5.2.2 The influence of supplier capabilities on collaboration in new product development**

Another aspect explored in the study was the influence of supplier capabilities on collaboration in new product development. The researchers sought to understand the impact of the capabilities possessed by suppliers on the collaborative efforts in developing new products. The findings of the study indicated a positive and significant influence of supplier capabilities on collaboration in new product development. This implies that the expertise, resources, and competencies of suppliers play a vital role in fostering effective collaboration during the development process. When suppliers have strong capabilities, they can actively contribute to the collaborative efforts, leading to better outcomes in new product development. Therefore, the study concluded that supplier capabilities have a positive and significant influence on collaboration in new product development.

### **5.2.3 The influence of collaboration in new product development on competitive advantage**

The study also aimed to explore the influence of collaboration in new product development on gaining a competitive advantage. By examining the relationship between collaboration and competitive advantage, the researchers sought to understand the impact of effective collaboration on the ability of companies to outperform their competitors. The findings of the study indicated a positive and significant influence of collaboration in new product development on competitive advantage. This suggests that when collaboration is effectively harnessed during the development of new products, it can contribute to creating unique and innovative offerings that give companies a competitive edge in the market. Therefore, the study concluded that collaboration in new product development has a positive and significant influence on competitive advantage.

#### **5.2.4 The moderating effect of research and development capabilities on the relationship between collaboration in new product development and competitive advantage**

Additionally, the study examined the moderating effect of research and development (R&D) capabilities on the relationship between collaboration in new product development and competitive advantage. The researchers aimed to understand how the presence of strong R&D capabilities can influence the relationship between collaboration and gaining a competitive advantage. The findings of the study indicated that research and development capabilities positively and significantly moderate the relationship between collaboration in new product development and competitive advantage. This suggests that when companies possess robust R&D capabilities, they can enhance the positive impact of collaboration on achieving a competitive advantage. The ability to effectively leverage R&D capabilities alongside collaboration can lead to the development of innovative and superior products, enabling companies to differentiate themselves and gain a competitive edge in the market. Therefore, the study concluded that research and development capabilities positively and significantly moderate the relationship between collaboration in new product development and competitive advantage.

#### **5.3 Conclusion**

The study delved into the connection between process capabilities and collaboration in new product development. The findings revealed a positive and significant influence of process capabilities on collaboration in this context. It was concluded that process capabilities play a crucial role in fostering collaboration during the development of new products.

Similarly, the study explored the impact of supplier capabilities on collaboration in new product development. The results indicated a positive and significant influence of supplier capabilities on collaboration. Consequently, it was concluded that supplier capabilities have a positive and significant impact on collaboration in the realm of new product development.

Furthermore, the study examined the relationship between collaboration in new product development and competitive advantage. The findings demonstrated a positive and

significant influence of collaboration on competitive advantage. Therefore, it was concluded that collaboration in the development of new products has a positive and significant impact on gaining a competitive advantage.

To expand on the research, the study also investigated the moderating effect of research and development capabilities on the relationship between collaboration in new product development and competitive advantage. The findings revealed that research and development capabilities positively and significantly moderate this relationship. As a result, it was concluded that research and development capabilities play a vital role in moderating the relationship between collaboration in new product development and competitive advantage.

Overall, this study highlights the importance of process capabilities, supplier capabilities, collaboration, and research and development capabilities in the successful development of new products and gaining a competitive advantage within Small and Medium Enterprises.

#### **5.4 Theoretical implication**

This study is strongly driven by dynamic capability theory because literature posits that companies in the similar industry behave differently because they have different resources and skills (Teece,2014) the RBV being viewed as static and not sufficient to give the company a competitive advantage explain in the changing market environment (Teece,2014) Additionally, the company's resource-based view looks at the company's unique, rare, and imitable resources that have created competitive advantage and business growth (Bertrand and Liang,2014) However, the process of maintaining competitive advantage is limitless and the process is dynamic (Hung et al., 2010) so scientists have suggested that in order to stay competitive in the market, the company should develop specific skills and continuous learning (Eduardo et al., 2012) which applies from the perspective of dynamic capabilities in particular in a new or changing market environment (Wilden et al., 2013 ). The lack of dynamic skills will make it impossible for the company to maintain its competitive advantage, especially in a changing environment (Gnizy et al., 2014). The application of dynamic capabilities in past literature has shown increasing interest among scholars since the inception of the international literature on ambidexterity (Hsu et al., 2013; Prange & Verdier, 2011)



explain ambidexterity as a company's ability to respond to environmental complexity and international experience in doing international business (Hsu et al., 2013).

According to dynamic capabilities theory, markets are more dynamic and companies differ in the skills they acquire and use different resources these discrepancies explain the differences in performance between firms over time (Wang & Kim, 2017). Teece et al. (2014) describes dynamic skills as higher-order skills for selecting, developing and coordinating common skills, i.e., H. to capture, grasp and transform. These skills also enable companies to transform information based on their needs. it also encourages learning and experimentation, combines resources for the creation of a new product , and transforms existing systems (Jiang et al., 2016). A company with dynamic capabilities can integrate and redeploy knowledge sources to achieve higher performance.

### **5.5 Managerial implication**

Organizations seeking to achieve good supplier capability must consider a strong capability to integrate various suppliers into one. Create a good capability to acquire materials for new products, share resources to help suppliers improve capabilities and innovation, develop a strong technological capability for utilizing electronic devices and have a strong capability to coordinate with key suppliers.

Management of organizations can achieve a good collaboration in new product development when they ensure high level of participation of inter-organizational in the process of new product development, collaborate to ensure that there is a continuous improvement in efficient and effective use of resources and create an enabling environment to enhance productivity consistently through resources collaboration.

Also, organizations can achieve good process capability by ensuring that production cycle time is short, market cycle time of new product is short, product returning rate is low, inventory expense is low, the frequency of re-work resulting is quality failure is low, do everything possible to eliminating waste, frequent training of their staff which will bring them up to speed and conduct quality engineering to cut down cost.



## 5.6 Recommendations

Based on the findings and conclusions drawn from this study, the following recommendations were deemed necessary.

SMEs should establish a dedicated research and development unit to effectively identify and implement optimal approaches for conducting their operations. Companies lacking a research and development unit may struggle to adapt to changes, miss out on new ideas, and fail to optimize their core activities. By establishing a research and development unit, SMEs can enhance their products and services, thereby positioning themselves ahead of competitors. It is imperative for organizations to prioritize the development of a research and development unit to continuously improve their core activities.

Small and Medium Enterprises (SMEs) can enhance their competitive advantage by providing periodic training and development opportunities to their staff. By equipping their employees with new skills and supporting their professional growth, organizations can outperform their competitors and stay ahead in the market. Neglecting employee training and development can lead to challenges in competing effectively. Hence, it is crucial for companies to prioritize staff training and development as a means to gain a competitive advantage.

Management of SMEs in Ghana should be prepared to adapt their designs to meet customer demands and maintain competitiveness. Organizations that proactively respond to design modifications can achieve high customer retention rates and gain a competitive advantage. Failing to respond to changes in product and service design to align with current trends can negatively impact a company's competitive advantage and financial performance. Therefore, it is crucial for organizations in Ghana to prioritize design modifications in order to sustain their business operations and attain a competitive advantage.

### **5.7 Suggestions for future studies**

A future study can look at the moderating role of information technology on the relationship between supplier capability and competitive advantage.

Also, a study can consider the mediating effect of top management support on the relation between research and development capability and competitive advantage.



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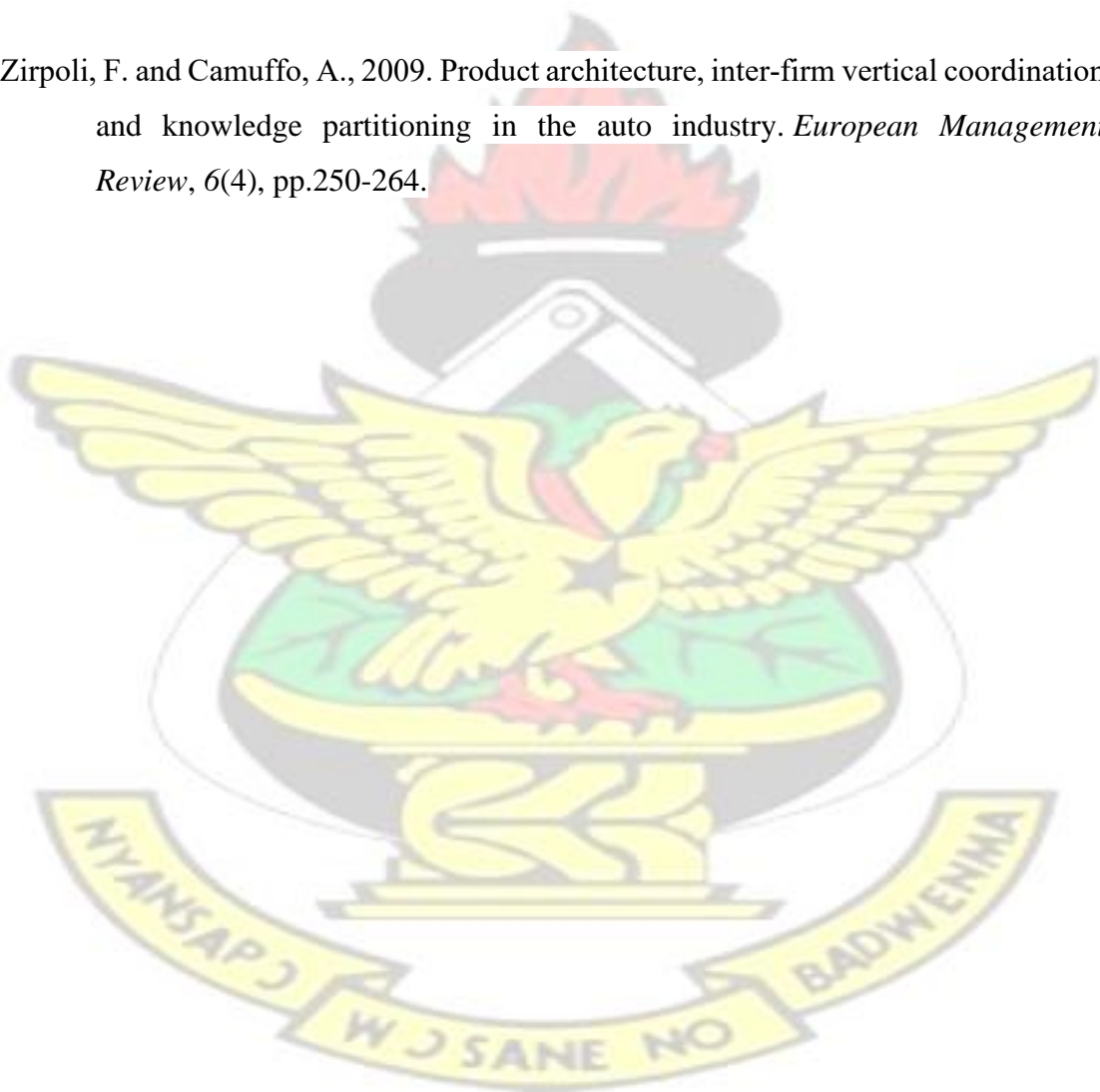
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## APPENDIX

### QUESTIONNAIRE

Dear Sir/Madam,

This questionnaire guide is in partial fulfillment of the award of Master of Philosophy (MPhil) in Logistics and Supply Chain Management, based on the topics “Process and Supplier capabilities and Collaboration in New Product development on Competitive Advantage. Moderating effect of Research and Development Capabilities: A survey of Small and Medium Scale Enterprises in the Western Region of Ghana”. The conduction of this exercise is strictly for academic purpose”. The responses as well as respondents’ identity shall not in any manner be used in a way that will be harmful to their personality. The researcher will therefore be very grateful if you would give the necessary assistance to facilitate the data collection

#### **PART A**

##### **Profile of Respondents**

Please tick (√)

1. Gender?
  - a. Male ☐
  - b. Female ☐
2. Age?
  - a. 20-25 years ☐
  - b. 26-29 years ☐
  - c. 30-35 years ☐
  - d. 36- 49 years ☐
  - e. 50-55 years ☐
  - f. 56 - 60 years ☐
3. How long have you been with the institution?
  - a. Less than 1 years ☐
  - b. 1-5 years ☐
  - c. 6-10 years ☐
  - d. More than 10 years ☐
4. What is your Educational Level?
  - a. HND/Diploma ☐
  - b. Bachelor Degree ☐
  - c. Post-graduate ☐
  - d. PhD ☐



## PART B

### 5. Process Capabilities.

On the scale of 1-5, answer the following questions by ticking (√) in the spaces provided.

Scale: 1= Strongly Disagree, 2= Disagree, 3 =Neutral, 4 = Agree, 5 = Strongly Agree

ITEM	STATEMENT	1	2	3	4	5
PC1	Production cycle time is short in our organization					
PC2	Market cycle time of new product is short					
PC3	Product returning rate is low in our organization.					
PC4	Inventory expense is low in my organization.					
PC5	Frequency of re-work resulting is quality failure is low					
PC6	My organization aims at eliminating waste					
PC7	My organization trains its staff which bring them up to speed					
PC8	We conduct quality engineering to cut down cost					

## PART C:

### 6. Supplier Capabilities.

On the scale of 1-5, answer the following questions by ticking (√) in the spaces provided.

Scale: 1= Strongly Disagree, 2= Disagree, 3 =Neutral, 4 = Agree, 5 = Strongly Agree

ITEM	STATEMENT	1	2	3	4	5
SC1	We have a strong capability to integrate various suppliers into one					
SC2	We have a strong capability to coordinate with key suppliers					
SC3	My firms share resources to help suppliers improve capabilities and innovation					
SC4	We have a strong technological capability for utilizing electronic devices					

SC5	It is easy to investigate quality problems in the organization					
SC6	We are involved in the design stage for new product development					
SC7	We collaborate in developing new products					
SC8	We have good capability to acquire materials for new products					

## PART D

### 7. Collaboration in New Product Development

On the scale of 1-5, answer the following questions by ticking (√) in the spaces provided.

Scale: 1= Strongly Disagree, 2= Disagree, 3 =Neutral, 4 = Agree, 5 = Strongly Agree

ITEM	STATEMENT	1	2	3	4	5
CNPD1	There is high level of participation of inter-organizational in the process of new product development in my organization					
CNPD2	My organization collaborates with other departments by sharing relevant information in order to meet all needs.					
CNPD3	My organization helps suppliers with improving their process to better meet my organization's needs					
CNPD4	By collaborating with suppliers, the speed of ordering system to procure materials have improved significantly					
CNPD5	Through organizational collaboration, there has been continuous improvement in efficient and effective use of resources					
CNPD6	Through collaboration, my organization involves key suppliers in continuous improvement programs thereby enhancing performance					
CNPD7	My organization has the capability to enhance productivity consistently through resources collaboration					
CNPD8	Collaboration among design, development, and marketing and production department is active					

## PART E

### 8. Competitive Advantage

On the scale of 1-5, answer the following questions by ticking (√) in the spaces provided.

Scale: 1= Strongly Disagree, 2= Disagree, 3 =Neutral, 4 = Agree, 5 = Strongly Agree

ITEM	STATEMENT	1	2	3	4	5
CA1	Our delivery time is fast.					
CA2	Our delivery compliance is high					
CA3	We reduce cost through process innovation					
CA4	We are highly capable of responding to pressing orders					
CA5	Our degree of design modification is low					
CA6	Small and Medium Enterprises can increase cost competitiveness with our help					
CA7	Small and Medium Enterprises can increase quality competitiveness of a new product development with our help					

## PART F

### 9. Research and Development (R&D) Capabilities

On the scale of 1-5, answer the following questions by ticking (√) in the spaces provided.

Scale: 1= Strongly Disagree, 2= Disagree, 3 =Neutral, 4 = Agree, 5 = Strongly Agree

ITEM	STATEMENT	1	2	3	4	5
RDC1	Developing new ideas to help new product development in my organization					
RDC2	Able to fast track new product development					
RDC3	R&D helps to differentiate products and enjoy cost-wise advantage					
RDC4	My organization enables the development of new product and utilizes new process					
RDC5	Research on R&D within our firm examines a range of issues from different theoretical perspectives					

**Thank you**