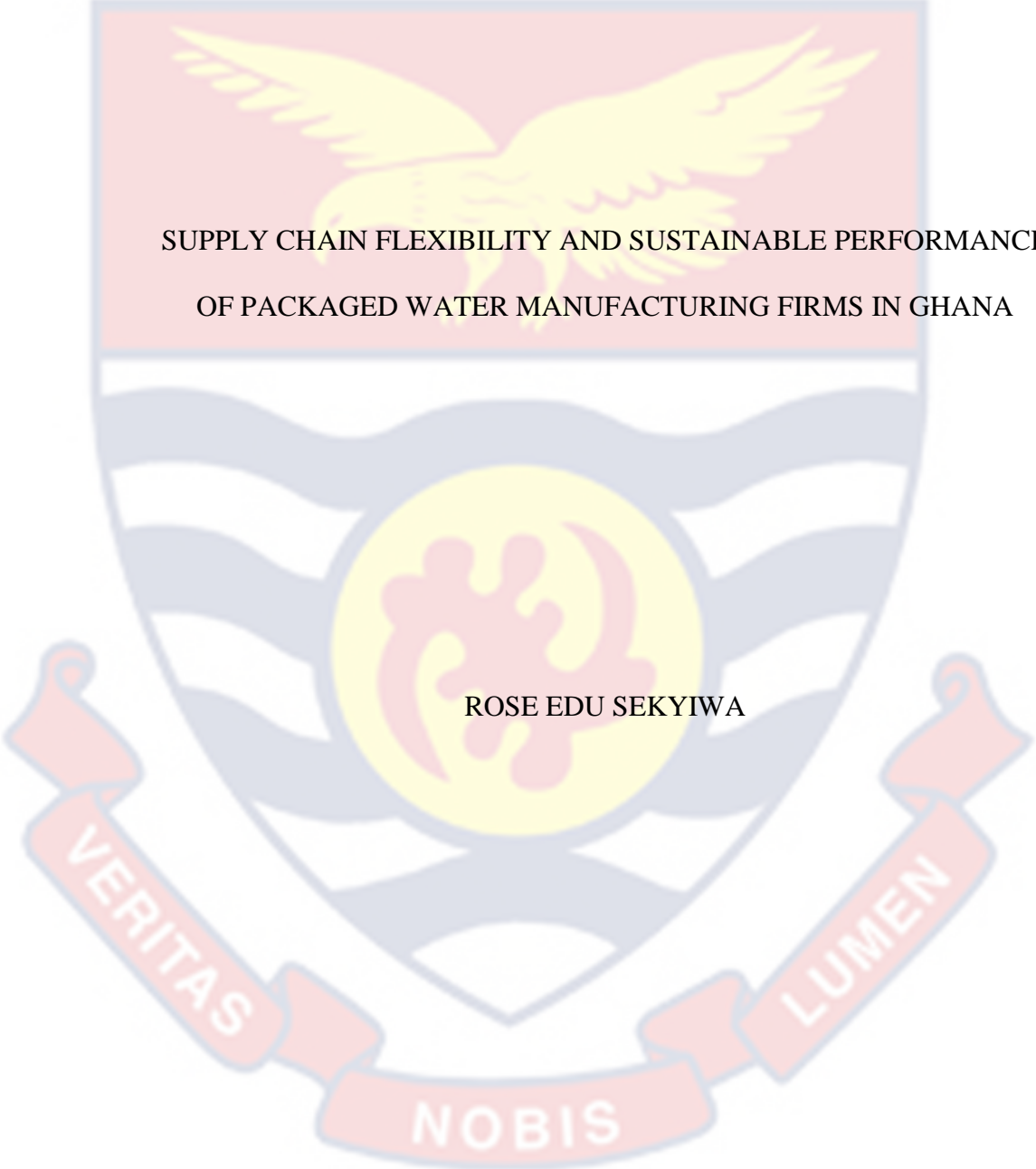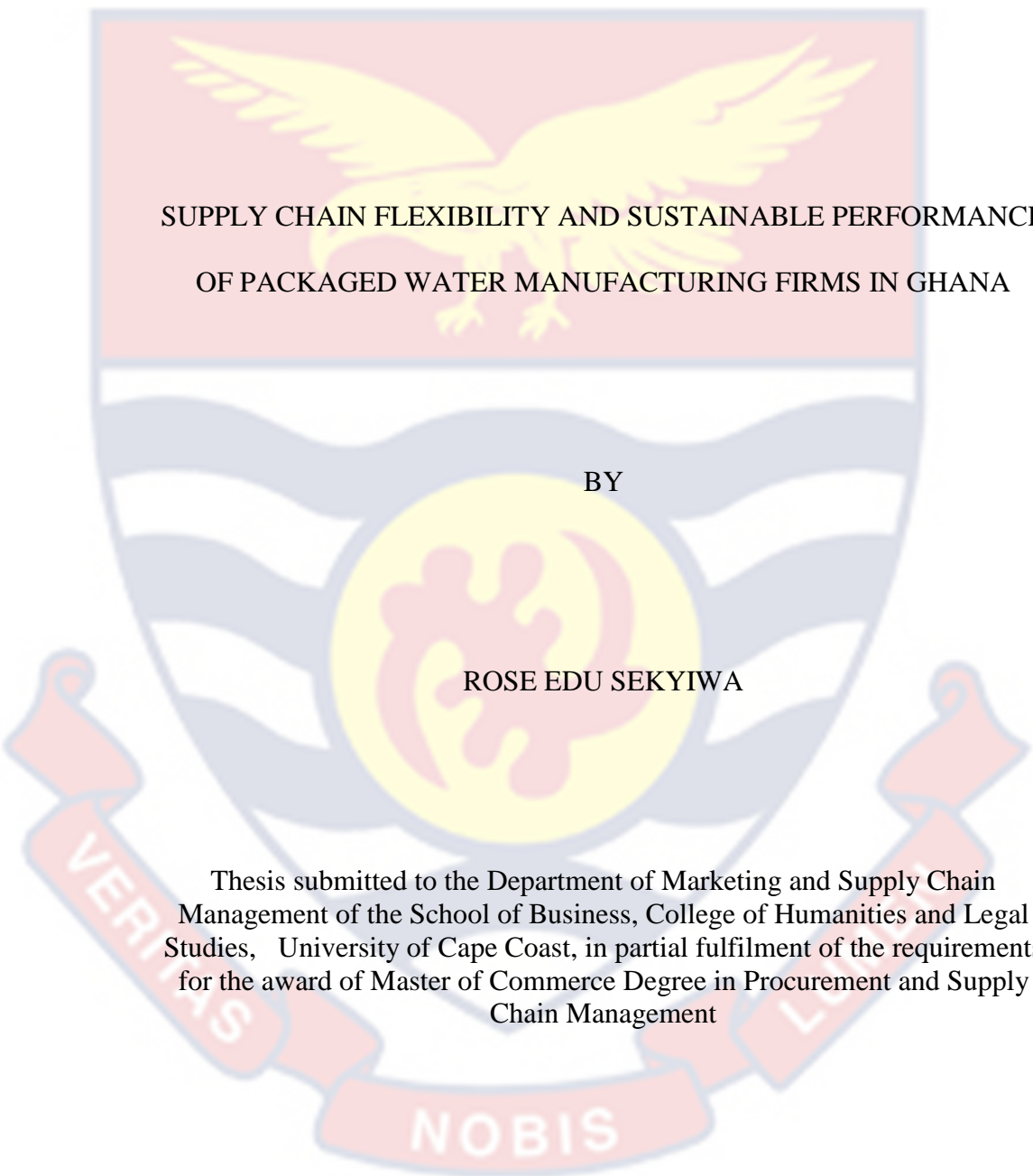UNIVERSITY OF CAPE COAST

SUPPLY CHAIN FLEXIBILITY AND SUSTAINABLE PERFORMANCE

OF PACKAGED WATER MANUFACTURING FIRMS IN GHANA

ROSE EDU SEKYIWA

2023

UNIVERSITY OF CAPE COAST

SUPPLY CHAIN FLEXIBILITY AND SUSTAINABLE PERFORMANCE

OF PACKAGED WATER MANUFACTURING FIRMS IN GHANA

BY

ROSE EDU SEKYIWA

Thesis submitted to the Department of Marketing and Supply Chain
Management of the School of Business, College of Humanities and Legal
Studies,   University of Cape Coast, in partial fulfilment of the requirements
for the award of Master of Commerce Degree in Procurement and Supply
Chain Management

APRIL 2023

DECLARATION

Candidate's Declaration

I therefore declare that this thesis is the result of my own independent work

and that no portion of it was submitted for another degree to this university or

elsewhere.

Candidate's Signature …………………………Date …………………….

Name: Rose Edu Sekyiwa

Supervisor's Declaration

We therefore declare that, in accordance with the guidelines set out by the

University of Cape Coast for the supervision of the thesis, the preparation and

presentation of the thesis have been supervised.

Principal supervisor's Signature ……………………… Date ………….

Name: Dr. N. Osei Owusu

Co-supervisor's Signature ……………………………… Date ……………….

Name: Dr. Eric Gonu

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ABSTRACT

This study emphasised on supply chain flexibility as an innovative strategic capability that links sustainable performance. The specific objectives were to examine: the effect of product flexibility on sustainable performance; the effect of product flexibility on sustainable performance; the effect of logistics flexibility on sustainable performance. The theories underpinning the study were the resource base view and dynamic capability View Theory. The study was based on the quantitative and positivism philosophy which was adopted together with an explanatory research design. A self-administered survey questionnaire was used as the research instrument for data collection. In all, 120 managers of packaged water manufacturing firms located in the Greater Accra were consulted. The study employed the partial least square structural equation modelling (PLS- SEM) as the statistical tool for data analysis. The findings of the study indicated that all the dimensions of the supply chain flexibility namely: product flexibility, modification flexibility and logistics flexibility have positive and significant effects on sustainable performance. Based on the study findings, it was recommended that managers need to incorporate supply chain flexibility in their strategic decisions when considering how to improve upon sustainable performance. This practice should be part of the long term strategy since supply chain flexibility does not happen overnight.
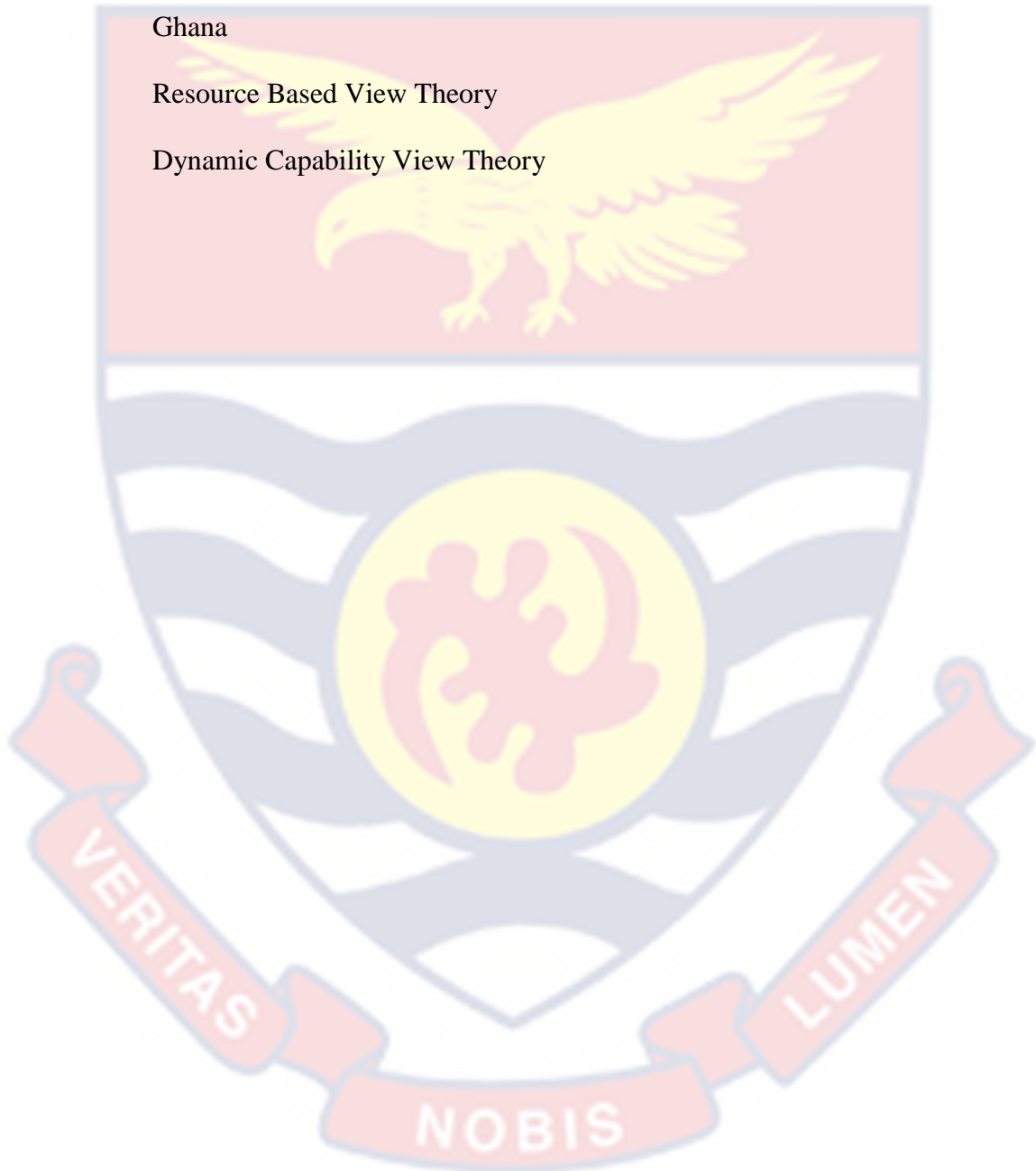
KEYWORDS

Supply Chain Flexibility

Sustainable Performance

Packaged Water Manufacturing firms

Ghana

Resource Based View Theory

Dynamic Capability View Theory

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I am greatly indebted to Mr Johnson Nyesemhwe, Mr Ian Yeknni, Mrs Pricilla Ahenkorah Nsiah, Mrs Ama Boatema Oduro Baah, Mrs Gloria Edu Armah Coker, David Edu Armah and Mr Bismarck Nsiah for their prayers, encouragement and financial support. Again I am indebted to Evelyn Kukuwa Quartey, Isaac Abbew, Isaac Channor Tetteh, Benard Nyarko, Prince Bight Attasti, Isaac Kyei Mensah, Obed Asamoah and Joseph Acquah for the contribution throughout my entire post graduate program.

However, I am entirely responsible for any error and omissions that may be found in this thesis. And to anyone who has helped in the completion of this work in diverse ways to make the writing of this thesis a reality.

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DEDICATION

To my dad Mr Johnson Nyesemhwe

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LIST OF ACRONYMS

AVE   Average Variance Extracted

CR   Composite Reliability

DCV   Dynamic Capability View Theory

DV   Descriminate Validity

HTMT   Heterotrait Monotrait Ratio

RBV   Resource Based View Theory
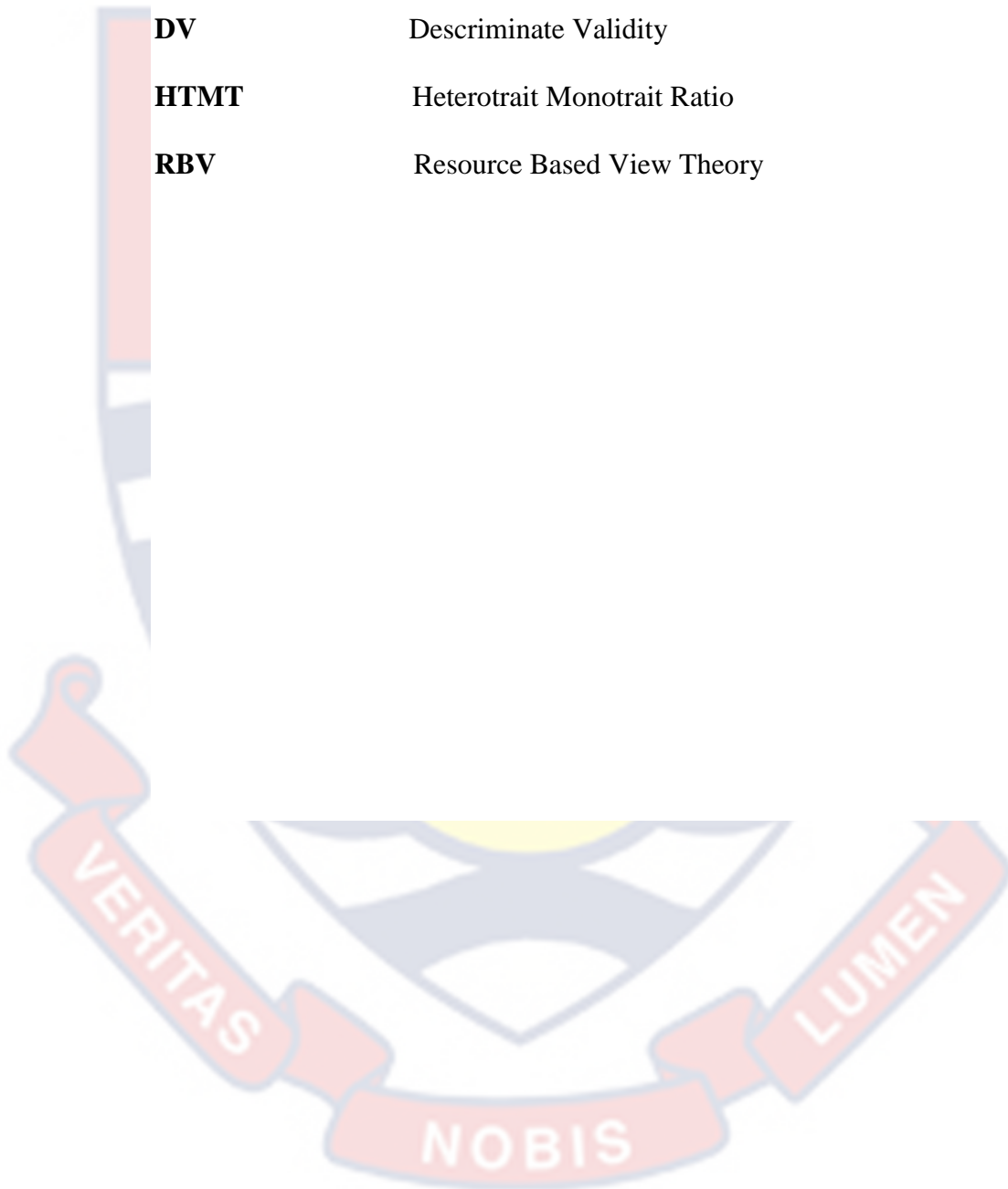
CHAPTER ONE

INTRODUCTION

This thesis is emphasised on assessing the relationship between supply chain flexibility and sustainable performance. The key chapters of this study are five and this chapter forms the first chapter of the study which presents the overview of the study to assist individuals to position the research in its' acceptable perspective. The chapter starts by providing the background of the study. This is followed by the statement of the problem, justifying the existing research gap that this study seeks to fill. In view of this, this part of the chapter provides the purpose, specific objectives and the research hypothesis. The chapter then proceeds to define and provide the boundary of the study that is its delimitation. The limitations, which are the caveats of the study, are also provided. This chapter ends with how the rest of the thesis has been organised.

Background of the Study

The rapid changes in client need globally, product-process technology, competition, uncertainties and globalisation has necessitated organisations to be both versatile and responsive (Maldonado-Guzman & Pinzón-Castro 2017). The tension, as consequences of competition in the industry has resulted to 20% of firms' failure in the bottle water manufacturing industry Igbeneghu and Lamikanra (2018). In Ghana this is evidence specifically in the packaged water manufacturing firms where the industry is experiencing a surging number of new entrants and has become very competitive. According to Mensah et al. (2021) 34.1% firms fail as a result of pressures from intense competition. In effect, these challenges take a heavy toll on the industry, forcing most companies out of business while preventing others from

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achieving their market share and growth, profitability, and competitive advantage.

These pressures to meet consumer needs are usually succumbing to unsustainability issues, where quality of product is compromised, end life of product is causing pollution, and wellbeing of the society is neglected. Thus firms should be focused on providing quality product instead of unhealthy competition. Wilson, Montoya, McGregor and Wutich (2022) opined that consumer's needs are constantly changing recently due to an increase of people being more health conscious and also due to increase concern over quality, therefore firms should adopt strategies that would help them meet ever changing needs of consumer and at the same time remain sustainable.

However, Liao (2020) argues that for a firm to be sustainable supply chain flexibility should be adopted, supply chain flexibility is a powerful competitive tool for manufacturers in today's increasingly turbulent business landscape. Supply chain flexibility represents a viable means of improving company efficiency and may significantly measure sustainable performance (Marhraoui & El Manouar 2021). Thus, supply chain flexibility will enable a firm's operations to respond swiftly to customer needs, enhance operational efficiency, ensures high product quality and adjust promptly to unforeseen activities. Supply chain flexibility helps reduce the production cost, increase competitiveness, and increase a firm's market share, profitability, and growth (Kyeremeh, 2019).

Markets are becoming more international, diverse, and customer-driven. Technological advancements are happening faster, resulting in new product innovation and manufacturing process improvements. Thus, meeting

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consumer demands necessitates flexibility, to the extent that it is recently known as a strategic capability. Flexibility can boost a company's competitiveness, particularly when deciding which technology to adopt and what resources to use, as posited by the Resource-Based View (RBV) Theory. This theory helps to understand when and how organisations can create flexibility as a unique supply chain property to gain a sustainable competitive advantage (Ketokivi, 2016). The RBV theory emphasised on resource heterogeneity, distribution, independence, usage, and imitability in developing capabilities for achieving competitive advantage in operations and supply chain management literature (Miller & Ross, 2003; Hitt, Carnes & Xu 2016; Ketokivi, 2016). However, the theory eliminates modification of these resources in a rapidly changing environment which the dynamic capability was introduced to fill the gap.

The dynamic capability view theory also stated that for firms to be flexible in uncertain environments, resources that had traditionally supported an organization's competitive advantage in business may no longer be sustainable in the ever-changing business climate. Thus, resources should be used dynamically to create a position for itself in the market by creating capabilities that can help it to perform better during environmental uncertainties. Hence, according to Teece et al (1997) the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments is dependent on how ideal resources are used for the advantage of the firms.

In Ghana's packaged manufacturing firms, there have been a few empirical researches on supply chain flexibility and sustainable performances.

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Other researches, on the other hand, looked at, the health and safety, purchasing decision of consumers, quality production of the packaged water processing firms in Ghana notably Quagraine, Opoku, Allah, & Donkor (2020): Quansah, Okoe, and Angenu (2015). However, Kyeremah (2019) evaluated supply chain flexibility and firm performance in Ghana. The study opined that supply chain flexibility had become a competitive tool for firms, helping them to capture and sustain market share and improve customer loyalty. For this background, this study will assess supply chain flexibility and sustainable performance in Ghana, focusing on packaged water manufacturing firms located in the Greater Accra Region.

Statement of the Problem

In recent times, globalisation and changing customer demand are the major market forces that have resulted to increased competition in all sectors of the economy worldwide, whereas packaged water manufacturing sector in Ghana is no exception. For instance, according to bottle water market analysis report (2021), imports of bottle water have increased 74% where as it consumption of this imported bottle water has surged by 85% from 2012 to 2022. This increase of consumption is as result of quality assumed on imported products, due to this pressure from globalisation and pressure from contentious entry of new competitors; this has resulted to fierce competition among the Ghana's packaged water manufacturing firms. This intense competition pressure has brought about sustainable issues.

To counteract this, though, organizations must maintain performance, thus the entire supply chain must be involved. This fierce competition, uncertainties, customer expectation, innovation and technological problems

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put pressure on businesses. Firms have attempted to handle these challenges over time by implementing traditional marketing strategies, such as more aggressive advertising Boerman et al. (2017); Kumar and Gupta (2016), however, these initiatives typically need a lot of resources. Nonetheless, according to Lummus et al. (2003) flexibility is one that would help firms to survive and thrive in an ever-changing competitive environment.

Following the works of Mezher and El-Khalil (2021); Sak and Taymaz (2017); Ivanov et al. (2018), consumers will be satisfied and remain loyal to the products or companies that are flexible, thus companies that adapt to environmental uncertainties with less cost and time, than those companies that are less flexible. In Ghana's report from Drinks Consulting Zenith International (2021) stated that firms' inability to retain their market shares is due to lack of flexibility in their operations. Hence, organisations must respond and adapt to customer needs or risk losing them to their competitors because of the intense competition in the industry. It is therefore not that surprising that the demand for some of the product on the market is insignificant. This is evidenced in the industry's contribution to economic growth where, Voltic mineral water which has been the pioneer of all mineral waters became second in the ranking of the leading bottle water company in the country (Digital Training Ghana report, 2022).

Kyeremah (2019) argued that supply chain flexibility could result in higher performance of firms in Ghana and be the remedy for satisfying and maintaining competitive advantage. However these studies only focused on competitive advantage without inculcating the means to sustain this advantage over time. Although some companies in Ghana have inculcated a lot of

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strategies to satisfy their customers such as understanding customer needs, listening to their feedbacks, paying attention to competitors among others, over years to ensure retention of customers, but supply chain flexibility still remains lower (especially the individual dimensions of flexibility) as compared to other companies across the globe (Ghana National Supply Chain, 2020). Companies are still in dilemma as to how to meet the needs of ever changing consumer attitude and behavior

The contemporary firms must be flexible to meet various uncertainties, and the growing concern of the environment is driving firms to be competitive on sustainable grounds. Thus, there have been several initiatives by government and various stakeholders to ensure that quality products are produced in an ethical manner; the environment is preserved, improving human resources, and increasing shareholder value as organisation inculcating flexibilities in its operations Zhou and Wang (2021). These initiatives include the Food and Drugs Board visiting every production site and urging them to use the right raw materials that do not compromise quality, the stakeholders ensuring that returns on their investment is increased and sustained, and mangers overseeing the welfare of workers among others. However, according to Ghana Statistical Service (GSS) report in 2021 some of the water products sold in Ghana are contaminated with faecal matter, raising the question about the regulation of this product on the market.

As firms are managing scarce resources in responding to uncertainties in their environments to gain competitive edge, issues sustainability should also be inculcated, thus simultaneously. Numbers of works have examined the relationship between supply chain flexibility and sustainable performance such

work includes Zhou and Wang (2021); Yang, Zhang and Rong (2018). Nonetheless, these works consider only one aspect of sustainability however, considering only one aspect of sustainability will not bring out the desired result. As suggested by Sun et al. (2019) that the supply chain flexibility should be assessed individually to know the individual potency on sustainable performance.

Other researchers have also conducted extensive researches to explore effective ways to be sustainable by examining the relationship between lean manufacturing and sustainable performance (Cherrafi et al., 2018; Zhu, Shah, & Sarkis 2018). However, the contribution which focuses on supply chain flexibility has been overlooked in the context of sustainable performance (triple bottom of sustainability) and also in the Ghanaian context. However inculcating in the Ghanaian context would help in the Ghanaian firms gain competitive edge over competitors, this is feasible as firms now survive by gaining sustainability through supply chain flexibility. It is against these gaps that this study examines the relationship between supply chain flexibility and sustainable performance in Ghana. Hence, there is a need to provide a robust empirical analysis of supply chain flexibility and sustainable performance in Ghana for these backdrops

Purpose of the Study

The study's general objective is to examine the influence of supply chain flexibility on sustainable performance of packaged water manufacturing firms in Ghana.

Objectives of the Study

Based on the study's general objective, the following specific research objectives will be formulated to guide the study.

1. Examine the effect of product flexibility on sustainable performance.

2. Examine the effect of modification flexibility on sustainable performance.

3. Examine the effect of logistics flexibility on sustainable performance.

Research hypothesis

H1a: product flexibility has a positive significant effect on economic performance.

H1b: product flexibility has a positive significant effect on social performance.

H1c: product flexibility has a positive significant effect on environmental performance.

H2a: modification flexibility has a positive significant effect on economic performance.

H2b: modification flexibility has a positive significant effect on social performance.

H2c: modification flexibility has a positive significant effect on environmental performance.

H3a: logistics flexibility has a positive significant effect on economic performance.

H3b: logistics flexibility has a positive significant effect on social performance.

H3c: logistics flexibility has a positive significant effect on environmental performance.

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Significance of the Study

This current study will be of practical use to Ghana's various industries, specifically the packaged water manufacturing industry. The results will reflect the ground regarding supply chain flexibility and how it influences sustainable performance. Understanding the packaged water firm's supply chain flexibility in Ghana has practical and theoretical significance. Practically, this study's insightful findings and recommendations will guide water manufacturing firms' principles to improve their supply chain systems in terms of adapting flexibility and gaining sustainable performance as a whole. It will also help management make strategic managerial decision.

For contributions to the literature, the findings will serve as a scientific basis which other researchers and writers could use to assess supply chain flexibility. The results of this study will also provide relevant materials for students and researchers undertaking similar research. It will generally contribute to the academic knowledge base and serve as a foundation for future analysis. At a theoretical level, this research enhances the theories used to underpin the study.

Delimitation

A single research can't possibly cover the complete spectrum of the phenomena such as supply chain flexibility and sustainable performance. Hence, it is prudent to concentrate on an aspect of the phenomenon that is so pressing for society. That is why the study used packaged water processing firms. Within the specified domain or scope, it is ideal that the research conducted an in-depth and objective analysis of the problem void of prejudices or biases. The study should have ideally looked at all manufacturing firms in

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Ghana. But due to sampling issues, regulatory differences, operational differences, and common weighing bias, the study resorts to using only bottle water manufacturing firms in Accra. This study could not also cover the in-depth of supply chain flexibility (i.e. the study couldn't include all dimensions of supply chain flexibility) and that of sustainable performance. Nevertheless, the choices of the sustainable performance dimensions and supply chain flexibility dimensions were strictly guided by relevance and relatedness to the concepts under study.

Limitations

This study acknowledged that though this study's results are relevant and valuable, there have been some limitations. However, these limitations have been adequately provided for in the study. Firstly, the uses of structured questionnaires discriminate against the knowledge of the members of the population since they could share further knowledge on the topic if given a chance. This could limit the information gathered on the topic under study. Fortunately, adequate consultations with the population and extant literature have nullified the effect of this limitation.

The study provided for this effect by including all questions necessary to achieve the objectives of this study. Also, this study used only employees of selected bottled water producers and disregarded sachet water producers who also contribute largely to environmental distortion with their end product for the selection of the study respondents. This will leave sachet water producers with relevant issues out of participation

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Definition of Terms

Supply chain flexibility

Although there is no universally acknowledged definition, supply chain flexibility is typically understood to be the capacity to respond to uncertainty and meet customer expectations. From the perspective of the whole supply chain, supply chain flexibility encompasses an organization's capacity to successfully adjust to changes.

Product flexibility

Product flexibility is degree of responsiveness (or adaptability) for any future development in a product design, including new products and derivatives of existing products.

Modification flexibility

Modification flexibility is defined as the process' ability to make function changes or alteration to a product.

Logistics flexibility

Logistics flexibility is defined as the capacity of a company to supply, support, and service customers in both inbound and outbound environments promptly and effectively.

Sustainable performance

Sustainable performance refers to a firm's long term competitive advantage in terms of economic returns that it achieves by taking into account the natural environment and human society, as well as not neglecting stakeholder requirements (Kleindorfer et al., 2005).

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Economic Performance

Economic performance is defined as the financial measures such as increase in return on assets, return on investments, market share, and profit.

Social Performance

It defined as firm's corporate social responsibility to a variety of stakeholders, including workers and communities, as well as stockholders.

Environmental Performance

The environmental performance inculcates primarily the preservation of the environment in which the supply chain works.

Organisation of the Study

The study is organised into five chapters. The first chapter deals with the study's introduction, which is made up of the background, problem of the study, the objectives and research hypothesis, the study's significance, delimitation, limitations, and the study's organization. Chapter two focuses on the literature review, containing the theoretical review, conceptual review, and the empirical review. Chapter three covers the research methods employed for the study. It consists of a research paradigm, research design, research approach, sample and sampling procedure, instrument, and validity and reliability. It also contains the systematic procedures adopted to gather and analyse the results and discussion. The last chapter, chapter five, presents a summary of the findings, conclusions, recommendations, and suggestions for further studies on the phenomenon.

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CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter covers a review of related literature on the topic under consideration, "supply chain flexibility and sustainable performance in Ghana". This section presents an in-depth review of the related literature on the theories underpinning this study, specifically resource based view theory and the dynamic capability view theory, the concept, and the empirical in the field of this study. As such, the study derived topics in this section from the objectives of the study. The literature review in this section is categorised under four broad subheadings namely theoretical review, conceptual review, and empirical review, finally, it will present the conceptual framework of the study.

Theoretical Review

The theoretical literature review helped researchers construct speculations that exist now, the connections among them, the degree of research on the current speculations, and new theories to be tested (Whetten, 1989). The theoretical review explains the theories that underpin the research in terms of the study's objectives. In essence, it reports on the philosophical view or propositions on each of the specific objectives and directly or indirectly presents the variables for measuring the specific objectives. Frequently, this structure is utilised to help set up an absence of suitable hypotheses or uncover that momentum speculations are lacking for clarifying new research propositions (Reay & Whetten, 2011). This thesis will be

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grounded on the theories of the resource-based view and dynamic capability view theory to help achieve the study's objectives.

Resource-based view theory has provided theoretical support for supply chain flexibility. As a complement to Porter's competitive positioning concept, the RBV theory can help us better understand supply chain flexibility and its importance as a strategic tool. According to Wu (2010), supply chain flexibility entails having flexible systems and dealing with the uncertainties that exist in the environment. According to Sawhney (2006), the origins of these uncertainties might be both internal and external to the company. The theory emphasises the interaction among supply chain flexibility's components, which help adopt changes in uncertain environments.

Wenefeldt (1984) proposed the RBV theory to illustrate how assets, strengths, and skills contribute to a firm's competitive advantages. The resource-based view of the firm (RBV) influences the field of strategic management (Newbert, 2007; Priem & Butler, 2001). Competitive advantage is created when resources are diverse, particular, and difficult to replicate and when a firm's product produces more value for its consumers than its competitive equivalent(s) Ansoff (1965); DeCastro and Chrisman (1995). As a result, variation in resource portfolios causes disparities in performance between businesses. When businesses have the potential to execute techniques that improve efficiency and effectiveness, they have important resources.

RBV is the most commonly used theory in strategy research to explain performance differences amongst businesses in the same industry Zott (2003). According to Penrose (1959), sustainable business expansion is dependent on internal firm attributes such as managerial competency and knowledge and

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technology economies of scale. The idea of the "resource position barrier", proposed by Wernerfelt (1984), encourages researchers to evaluate distinct business resources as sources of long-term competitive advantage. RBV was deemed a critical element in formulating corporate strategy by Barney (1986). According to researchers, firms possessing resources that are valuable, unique, inimitable, and non-substitute can achieve sustainable competitive advantage by employing novel value-creating strategies that are difficult for competitors to replicate (Barney 1986; Dierickx & Cool, 1989; Grant 1991; Newbert 2007; Ray et al, 2004; Uhlenbruck et al 2006; Wernerfelt, 1984).

According to Barney (1991), firms thrive by creating unique tools that function as competitive advantages over its competitors. Scholars have argued that the RBV can describe several firm and supply chain outcomes Esper and Crook (2014), Hitt, Carnes, and Xu (2016). Therefore, it is not surprising that strategic management scholars identified and translated Penrose's original ideas to understand how firms create advantages over industry rivals with their strategies. Wernerfelt (1984) was one of the first to do so by linking competition among product market positions to competition among resource positions. A scholarly dialogue between Barney (1986, 1991) and Dierickx and Cool (1989) further advanced our understanding of resource-based competitive advantages. They also proposed a model of asset stocks and flows to explain the development and sustainability of competitive advantages.

Specifically, they suggest that asset stocks are strategic to the extent that they are subject to time compression diseconomies, path dependencies, interconnectedness, social complexities and causal ambiguity which collectively (or sometimes individually) lead to competitive advantages.

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Dierickx and Cool (1989) also argue that a firm's sustainable competitive advantage is contingent on the firm's ability to continuously recombine its asset stocks and apply them to new market opportunities. Thus, a firm's most critical resources are accumulated rather than acquired in strategic factor markets. These ideas help to explain how similar bundles of resources between two firms can have different effects on performance, and also why similar investments by two different firms over the same period of time may not result in the same outcomes. Barney (1991) built upon these ideas to suggest that firms need valuable and rare resources to gain a competitive advantage, but in order to sustain that advantage over time, the resources must also be difficult to imitate and non-substitutable by other firms' resources.

The resource based view asserts that the successful achievement of sustainable growth requires the support of specific resources (Morash, 2001; Liu et al., 2016). In particular, supply chain flexibility is a key firm specific capability Seebacher and Winkler (2015), which may enable the successful achievement of sustainable performance. Hence, the future competitiveness will be based on core competences, which are higher second level aggregations of talents Del Canto and González (1999). Core competences enable businesses to outperform their competitors and can provide corporations with competitive benefits as well as possible comparative advantages Del Canto and González (1999), Mowery, Oxley, and Silverman (1998), and Anderson and Kheam (1998) have recently proposed that a firm's combined skills from collaborative partnerships with other enterprises and governments are closely connected to their selected international strategy.

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Most empirical findings are compatible with RBV predictions, thus those studies do not include participants in changing contexts, and researchers have extended RBV to dynamic capacity theory for changing markets. Though the resource based view seen as static in its approach and will not be sufficient to explain competitive advantage in a changing environments, researchers propose adopting the Dynamic Capability View Theory (DCVT) is important, this is because changes in consumer needs, competition, innovation, product quality has shifted the competition landscape for firms. Thus, in such context simply having appropriate set of specific resources is inadequate to establish and sustain competitive advantage in changing environment. Also, firms benefit more from flexibility in operations, its related stages and procedures in dynamic settings rife with rising uncertainties, making it easier to adapt to unfavourable conditions. Thus, firms must also have dynamic skills in order to adjust to changing circumstances. According to Eisenhardt and Martin, (2000), the value-added role of Dynamic Capability View Theory to the resources posited in the organisation has impacted the study's decision to choose the second theory, dynamic capability view theory.

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Furthermore, the study established a clear link between firm performance and dynamic capacities, emphasising that if a business lacks dynamic ability in a changing environment, its strength and survival will be temporary. Teece (2007) supports this, stating that the creation of dynamic capabilities is to discover the sources of a business' competitive advantage at the enterprise level, and that firm's success or failure determines this. Additionally, Eisenhardt and Martin (2000) proposed that a firm with dynamic capabilities will have an advantage over a competitor who lacks those capabilities; whereas Zott (2003) claims that a firm with distinct dynamic capabilities may develop different types of resources, resulting in differentiated performance levels. The lack of dynamic capabilities will make it difficult for the company to sustain its competitive advantage, particularly in a changing environment Gnizy, Baker, and Grinstein, (2014). Dynamic capabilities, according to Eisenhardt and Martin (2000), are the process of using existing resources to generate new resources capable of causing market change. When a market evolves, emerges, splits, or even dies, it changes.

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Aside from that, dynamic capabilities are the outcome of the acquisition, integration, and recombination of resources to generate new strategies. As a result, dynamic capabilities are component in the development of new competitive advantages (Henderson & Cockburn 1994).

Various literature that examine the importance of Dynamic Capability View Theory in enhancing supply chain flexibilities stem from the contributions of Neweyand Zahra (2009); Easterby-Smith and Prieto (2008); Schreyogg and Kliesch-Eberl (2007), and Teece et al. (1997). The dynamic capability view theory argues that dynamic capabilities are the way to solve inflexibility in capabilities, how to utilise and make use of the knowledge, and how dynamic capabilities can explain how firms respond to change especially from the environment.

In a similar manner in flexibility, dynamic capabilities are recognised to adjust with changes in the environment to sustain competitive advantage. Teece (2007) highlighted the privileges that come with a dynamic market. In an uncertain environment, Wu (2006) discovered that resources, whether from the business itself or from connected support enterprises, had no direct impact on performance. Resources, on the other hand, affected performance through exercising dynamic capacities. It makes sense to use resource management methods to operationalise dynamic capabilities Xiao et al, (2008). Building capabilities, according to Amui, Jabbour, Sousa Jabbour, and Kannan (2017), may improve performance in areas such as quality, flexibility, and delivery.

The dynamic capability theory explains the core competencies that should be used to modify short term competitive positions that can be used to build sustaining competitive advantage. Dynamic capabilities enable

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companies to respond to changes in the business environment and change their operational capabilities accordingly. Teece et al. (1997) defined dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." Also, in a turbulent and rapidly increasing market, company resources must be dynamic, and managers must understand how to modify strategy to the environment in order to develop new capabilities that can match the market's dynamic (Monteiro, Soares & Rua, 2017). Effective dynamic capabilities contribute to a company's competitive advantage by permitting a succession of transient advantages that allow a company to stay ahead of the competition and retain a competitive advantage (Eisenhardt & Martin 2000; Teece., 2007).

Furthermore, successful businesses can efficiently manage and redeploy internal and external resources. The approach explains how firms create firm-specific competencies to adapt to changes in the business environment is ultimately linked to the firm's business processes, market positions, and prospects Teece et al. (1997). The DCVT takes an approach to competition, with enterprises continually working to form "new combinations" and market competitors constantly attempting to increase their competencies or replicate the competence of their best qualified competitors Teece and Pisano (1994). In a growing industry, rivalry is thus unavoidable, which means that a company's capacity to improve or generate new types of competencies is critical to gaining and maintaining competitive advantage. Despite this, the dynamic capability view theory identifies and examines the influences that promote survival, performance, and legitimacy of corporate practices while acknowledging resource usefulness. Thus, organisations that

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are willing to maintain or adopt these strategies are prone to greater and more competitive advantage.

The dynamic environment's efficiency and effectiveness can explain the variations in firms' competitive advantage and overall performance, supply chain flexibility adoption, and the net effect on sustaining performance per the dynamic capability theory's position. Evidently, the institutional theory has been used successfully in the supply chain fraternity, notably Sandberg (2021), Yang and Gan (2020), Spanuth, Heidenreich, and Wald, (2020), Mikalef, Pateli, and van de Wetering (2016), Wetering, Mikalef, and Pateli, (2017), Genchev, and Willis (2014), and Weerdt, Volberda, Verwaal, and Stienstra (2012) have all drawn on the Dynamic Capability View Theory to examine various concepts and phenomena in supply chain management.

Conceptual Review

According to Saunders, Lewis, and Thornhill (2006), a conceptual review is the act of integrating multiple linked ideas to explain or forecast a specific occurrence or to gain a better meaning of phenomena of interest in a research problem. More so, conceptual review in quantitative research becomes necessary when the theories used to underpin the study do not contain or bring out the variables directly to measure the study's objectives. This section will discuss the concepts of supply chain flexibility, sustainable performance and their related dimensions.

Supply chain flexibility

In today's ever changing and competitive business environment, all firms in the industry depend on strategies to help them survive. However, for a firm to adopt strategies, this strategy must provide value especially in

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turbulent environment over a sustained period (Grigore, 2007). This is the motive of supply chain flexibility. Candace, Ngai, and Moon (2011) define flexibility as firm's ability to adjust to unforeseen changes in the environment, both in its manufacturing process and in the marketplace. Huo, Gu, and Wang (2018) opined that supply chain flexibility gives firms the capacity to collaborate across and within firms to integrate internal, upstream, and downstream processes.

Attia (2016) opined that supply chain flexibility indicates adaptation, alignment, and agility in supply chain functional operations. This means that flexibility considers a variety of factors when dealing with change in a timely, cost-effective, and high-quality manner (Swafford et al., 2006; Dove, 1994, 1999). In views of Fayezi et al. (2014), supply chain flexibility should include partnerships with both upstream and downstream administrations of the supply chain, as well as all stakeholders, in order to provide value to the consumer. The upstream includes supplier flexibility as well as procurement process flexibility, which allows a business to handle the different sources of uncertainty it may face. Downstream encompasses range of uncertainties caused by demand, for example, forecasting errors, demand volatility, lack of market transparency as well as non-visibility of competitive information and sub-optimal inventory strategies (Soon & Udin, 2011; Wadhwa et al., 2008).

As defined in the Oxford Dictionary, flexibility is "the ability to adapt to change" or "the ability to bend as per condition". In other words, flexibility refers to a company's ability to react to unanticipated changes globally, both in its manufacturing process and in the marketplace. According to Kyeremeh (2019), flexibility has to do with an organisation's ability to adapt to changing

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circumstances and satisfy a growing range of consumer demands without incurring unnecessary costs, time and operational delays, or performance losses. In view of this, this study conceptualises supply chain flexibility as the ability for supply chain to quickly respond to the ever-changing consumer needs without compromising performance.

Product flexibility

As market environment is changing consumers need more variety, better quality, and service, including reliability and faster delivery (Duclos et al., 2003). Products evolution have resulted because of various factors such as changing customer needs, improved manufacturing methods, new technologies, legal and regulatory policy changes. According to Sánchez et al, (2005), in a supply chain framework, product flexibility is defined as the capacity to manage complex, non-standard orders, fulfil unusual client criteria, and develop goods with many features, alternatives, and sizes. While product flexibility is a top priority in the operations literature, it also necessitates the efficient collaboration of other functional actors like marketing, product design and development, and engineering.

In the views of Manu (2017), product flexibility can be seen as mix flexibility, process flexibility and product mix flexibility which entails the ability to produce multiple products on the same capacity, and the ability to reallocate capacity between products in response to realized demand. This means the ability of a manufacturing system to produce to meet consumer's ever changing demand (Cao et al., 2021; Lafou et al., 2018)

Bauer et al (2017) opined that product flexibility refers to a product's ability to adapt to future changes in design, such as new goods or variants of

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existing products quickly and in an economic manner. It facilitates the management of non-standard orders and enables for a faster response to customisation requests. Hence, product flexibility is related to product produced according to customer's requirement in different varieties. Goyal and Netessin (2011) argued that the ability to manufacture diverse products on the same capacity, and the ability to reallocate capacity between products in response to realised demand.

Regardless the name one gives product flexibility; it is the ability to manufacture product that meet consumer needs. Hence this study conceptualised as the ability of firms to be adaptive for change in a turbulent environment to produce product to meet consumer ever changing needs.

Modification flexibility

As demand changes and there is a lot of variety of product in the market, existing product needs to be modified in order to satisfy changing needs and wants of existing customers and bring on board new consumers (Kyeremah, 2019). Modification flexibility refers to a process' ability to make functional changes to a product. These small changes are caused by customer wants that are undetermined at the start of the lifecycle for a standardised product or throughout the lifespan for a customisable product. These changes may arise at the beginning of the life cycle for a standardised product or throughout the life cycle for a product that can be customised.

According to Abdulkareem, Awwad and Almahamid (2019), the ability of the manufacturing process to customise products through minor design modifications. Customisation of product means the quick response to deal with customers' needs and wants to satisfy all levels of customer

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expectations. It is believed that operational goals are affected by changes associated with product life cycle which is becoming shorter due to the rapid changes in business environment.

Attaria et al. (2015), Davidson (2018), and Hanssan (2019) have all shared similar view on the concept of modification flexibility. Evidently, these studies have all been conducted in different countries, signifying that irrespective of the geographical location, modification flexibility will not differ widely among firms. However their adoption and use differs firm to firm and industry to industry. This calls for the need to establish the degree of importance of modification flexibility among firms in various industries. Thus this study conceptualised modification flexibility as the ability to alter existing product to meet the needs of consumers.

Logistic flexibility

To Zhang et al. (2005) logistics flexibility is defined as the ability to respond quickly and efficiently to changing customer needs in inbound and outbound delivery, support, and services which is categorise logistics flexibility in four dimensions; thus, physical supply flexibility, purchasing flexibility, physical distribution flexibility and demand management flexibility. Physical supply flexibility is the ability of a firm to provide a variety of inbound transportation, warehousing, and material inventory quickly and accurately. It enables firms to coordinate the delivery of incoming goods (Zhang et al., 2002).

Purchasing flexibility is the ability of a firm to provide the variety of materials and supplies quickly and performance effectively through cooperative relationships with suppliers (Zhang et al., 2005). It reflects the

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ease with which the firm can exercise its procurement options. Physical distribution flexibility is the ability of a firm to adjust inventory, packaging, warehousing, and transportation of physical products quickly to meet customer needs (Zhang et al., 2005). This type of flexibility is referred to by Porter (1985) as outbound logistics flexibility, which deals with delivering the finished product to customers in a reliable and efficient manner. In this context, delivery flexibility is fundamental to a company's capability to provide products and services under changing market conditions.

Demand management flexibility is the ability of a firm to respond quickly and performance effectively to the variety of customer needs in terms of order-taking, delivery scheduling, installation, repair, training, and product maintenance (Zhang et al., 2005). The importance of coping with demand uncertainties requires the firm's ability to respond to individual customer requirements. Quick reactions have the potential to increase the customer satisfaction and encourage the development of sustainable relationships (Jüttner et al., 2003).

Logistics flexibility corresponds to the means to respond quickly and efficiently to changing customer needs in inbound and outbound delivery, support, and services (Zhang et al., 2005). Thus, flexibility in logistics is needed, in the short term, to provide responsive physical connections across the supply chain, and, in the long term, to apply to new inbound and outbound logistics.

According to Cheshmehgaz et al. (2017) Logistics flexibility is critical as it reflects the firm's ability to adapt to dynamic market by using alternate resources in a physical distribution thereby minimising response time to

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consumers. Goyal et al. (2019) defined logistics flexibility as coordinating among supply bases is the key to attaining necessary to enable them to progressively improve logistics process in response to rapidly changing market conditions. Logistics is geared towards widely recognising as an important firm capability in supply chain (Jafari 2015).

Regardless of the angle from which one looks at logistics flexibility, it has comprised three dimensions: Purchasing flexibility, Demand management flexibility, Physical distribution flexibility and, physical supply flexibility. Hence this study conceptualised logistics flexibility as the ability of a firm to respond quickly efficiently to changing consumer needs.

Sustainable performance

The significance of studying sustainable performance has increased over the years. Sustainable performance ensures that firms holistically balance their economic environmental and social goals. Many firms, management practitioners and scholars have been interested in learning more about how firms survive and develop. Some businesses appear to be able to quickly devise and implement novel answers to dangers and opportunities that arise in their environment. It is seen as a key determinant of organisations to adapt and respond to emerging threats and opportunities, and thus be sustainable.

In this, context, sustainability is referred as an organisation's ability to maintain or improve its performance over time. The sustainability is categorised into three mainly economic, environment and society. Economic growth, social cohesiveness, and environmental awareness are not new concerns, but the intricacies of achieving these three goals at the same time are becoming more important by the day. The significance of sustainable

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performance resides in a new method of doing business that includes deliberately incorporating economic, social, and environmental issues into company activities and plans, thus, achieving economic return with lower environmental harm and greater social welfare.

Growing environmental concerns, particularly the impact of climate change, have prompted a focus on unsustainable behaviour patterns in manufacturing supply chains. Companies can seize the multifaceted opportunity presented by addressing economic, social, and environmental concerns. The researcher will build on previous research to argue that integrating sustainable practices improves long-term growth by allowing businesses to reduce waste disposal and raw material costs, increase product value and firm competitiveness, reduce public and community pressure, and even help shape future regulations that raise competitors' relative costs.

Economic performance

Starting with, the idea that business is more than just an economic entity that acts in the financial arena of society; it is also inextricably linked to social and environmental issues. Productivity and financial returns on assets are referred to as economic growth. Yang et al. (2017) argued that businesses spend their resources more effectively than their competitors, they benefit from a higher rate of return. Economic success is measured by financial measures such as increase in return on assets (ROA), return on investments (ROI), market share, and profit (Huo, Gu, & Wang, 2019). However, Abdul-Rashid et al. (2017) opined that economic performance is measured on the basis of both financial and operational outcome. From the operational perspective, economic performance is associated with the capability of

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manufacturing firms to decrease cost related to buying inputs waste treatment and discharge, energy consumption and fines or penalties and environmental accidents. Thus this study conceptualised based on the financed based indicators such as return on asset, sale growth, and profit. This measurement is supported with the works which include (Yang et al., 2018; Frimpong et al., 2020)

Social performance

The social aspect of the triple bottom line of sustainability aims to reflect the organisation's social care for its stakeholders (Hammann et al., 2009). Beyond economic interests, social growth assesses how firms contribute to the public and society (Huo et al., 2019). It demonstrates corporate social responsibility to a variety of stakeholders, including workers and communities, as well as stockholders. The handling of social concerns across the supply chain is the focus of social sustainability practices (Mani et al., 2018). Marshall et al. (2015) identified two types of social practices. These are divided into two categories: basic (which covers safety, welfare, and health), and advanced (which includes product and process-related concerns). According to Fombrun et al. (2000), firms invest in sustainability activities to develop reputation capital. Sustainability has become a mandate for human survival and advancement Sharma and Ruud (2003), and should be attained in *"an inclusive, connected, equitable, prudent and secure manner" (*Gladwin et al., 1995). Thus, social perspective of sustainable performance is inclusive of the individuals as well as the organisation as a whole. This study measures social performance by employee safety and health, improved the quality of life

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of the community, training and development, this is supported by (Rao and Holt, 2005; Dai, 2018).

Environmental performance

The environmental dimension of the triple bottom line of sustainability is primarily concerned with the preservation of the environment in which the supply chain works. It is critical that the supply chain activities and functions are carried out in such a way that the ecosystem is neither disrupted nor damaged. One of the most significant drivers of environmental depletion is industrialisation. Due to rising demand from stakeholders regarding environmental concerns, organisations are now considering numerous environmental issues; nevertheless, due to the inherent nature of the processes involved, there are corporations that can implement sustainable practices. In a closed-loop supply chains a circular manner of conducting business where wastes are recycled as raw materials and or end-of-life goods are repurposed as inputs can help with environmental sustainability, among other things (Zhu et al., 2013; Zhu et al., 2008; Kleindorfer et al., 2005). As such this study conceptualises environmental performance which is said to be achieved when manufacturing firms minimise solid waste, reduce their carbon emission, used of product which can easily be recycled, reduce the frequency of environmental accidents. This conceptualisation is supported by the works of (Goyal, 2017)

Supply chain flexibility and sustainable performance

Supply chain flexibility has gained spotlight and plays a critical role in businesses due to its importance that it's a strategy for firms to gain and sustain competitive advantage. As evidenced by comprehensive studies on

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resource based view theory and dynamic capability view theory (Fredericks, 2005). Supply chain flexibility, is referred to as "adaptability in a product". Thus, it plays a crucial role in enhancing firms gaining and sustaining firms' market share however, this done concurrently with sustainable practices leads to superior performance (Alamro, 2015). Research revealed that supply chain flexibility does not only affect how firms adopt changes in the environment, but they are firm's strategies. Thus, these strategies can help firms to stay competitive in ever changing environments; this is evident in the works of (Goyal, 2007). Again, Gelhard and Delft (2015) stated that supply chain flexibility positively impacts sustainable performance, classified as value chain flexibility. With regards to the above review, this study can conclude that there is a relationship between supply chain flexibility and sustainable performance.

Empirical Review

An empirical review according to Neuman (2014) demonstrated that empirical review enables the analyst to maintain a strategic distance from duplications in the current information. Similarly, Rowland et al. (2018) noted that empirical review offers the chance to distinguish and tend to the current methodologies and limits in the study area and the underpinning theories. Thus, as Nakano and Muniz (2018) revealed, an empirical review is accounted for in such a way that different examiners see unequivocally what was done and what was found in a specific study to the degree that they could replicate the study to decide if the discoveries are imitated when rehashed. Here, the key issues are the problems focused upon, the methodology employed, and the key findings and conclusions. This section looks explicitly at empirical works

on supply chain flexibility (individual dimension of flexibility), and sustainable performance.

Product flexibility and sustainable performance

Supply chain flexibility, especially product flexibility, is widely acknowledged as an important strategic capability. From the dynamic capability theory and the resource-based view theory perspective, supply chain flexibility will lead to the sustainable performance of firms. This is because firms do not only need valuable resource but also dynamic capability, which will help the firm renovate these resources to meet consumers' needs in this changing environment. This theoretical position motivated studies to reaffirm this stand.

For instance, Mezher and El-Khali (2021) conducted a study to examine the relationship between supply chain flexibility, sustainability and their influence on operational performance. A conceptual model combining flexibility, sustainability, and operational performance was designed and empirically evaluated based on contingency theory and resource-based view theory. The study employed the quantitative research approach and was primarily based on a survey that included 140 participants, thus managers from OEM plants in Europe and the United States. Though, Mezher and El-Khali (2021) contributed largely to knowledge, the findings revealed a strong and positive relationship between product flexibility and sustainability. The study, however, was marred by no evidence of population and sample size, making it difficult to generalise the study.

Similarly, other studies, such as Sandeepaa and Chand (2018), indicated that product flexibility will enable firms to achieve sustainable

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performance. The study employed the quantitative approach which considered several parameters connected to supply chain management's long-term flexibility, which was also discovered through literature analysis and expert opinion. Using the Total Interpretive Structural Modeling (T-ISM) approach, the researchers established the interconnections between these components. It also uses MICMAC (Cross Impact Matrix Multiplication Applied to Classifications) analysis to develop policies for sustainable industry growth. The study's findings showed that product flexibility is important for attaining supply chain sustainability. However, the T-ISM-based model heavily relies on expert judgments or opinions and does not consider all stakeholders' perspectives. Furthermore, just a few flexibility tactics were recognised as elements that should be improved. Also, the paper focused solely on the flexibility that leads to sustainability without evaluating the efficiency of these aspects.

Also, Bauer, (2017) investigated the meaning of flexibility, its dimensions, properties, and various evaluations and measuring methodologies. This exploratory design was concentrated on expert interviews which were performed to get more in-depth insights and draw judgments about the validity of the stated hypothesis. The study strived to build on the identified situation by conducting an empirical study into measuring supply chain flexibility. Based on the theoretical analysis and empirical investigation, it was determined that assessing supply chain flexibility could not be done with only one performance indicator. The study employed the qualitative approach. The result indicated that product flexibility could lead to customer satisfaction, leading to customer loyalty. However, the methodological approach didn't

concentrate on the border perspective, thus not encompassing a variety of sectors and enterprises.

Furthermore, Alamro, (2015) has linked positive relationships by investigating the impact of product flexibility on the operational performance of manufacturing companies. The study employed quantitative research approach; it used a questionnaire for data collection via a survey approach. The study sampled 320 managers representing 100 manufacturing companies with valid responses, representing a 39.97% response rate. Partial least squares structural equation modelling (PLS-SEM) was applied through SmartPLS3.4.2 for empirical validation and reliability of the research model and identified the practices contributing to product flexibility and its outcome on sustainable performance.

The result reveals that organisations must blend sustainability, product flexibility, and digital capabilities to succeed in a dynamic, turbulent resource-scare system. Product flexibility influences high sustainable performance and relationship performance. The study further confirmed that product flexibility positively affects operational performance by improving quality, productivity, cost and lead-time. The study report includes suggestions for further research for managers. This study has a drawback; it could not control alternate hypotheses for the dependent variable. This control variable is a variable that impacts the relationship between an independent and dependent variable. Thus, this control variable should be held constant to influence the study's outcome. It also couldn't use an interactive word to describe the overall impact of product flexibility on performance metrics.

Gelhard and Delft (2015) looked at how companies achieve sustainable performance through supply chain strategy and value chain flexibility (product and logistic flexibility). The quantitative study based on a survey of chemical companies in Germany to obtain information from managers for the study. An online questionnaire with closed questions was employed.

The research looked again at sustainability as significant to the business, emphasising the importance of flexibility in strategic and operational activities in attaining high sustainability performance. The survey also found that strategy and value chain flexibility help businesses to offer sustainable products and services on time, respond to changing consumer demands, cut lead times, and save inventory costs. The study examines the mediating role of value chain flexibility within the relationship between strategic flexibility and sustainable performance. However, one department or function cannot provide the breadth and intensity of flexibility needed to cope with changing customer requirements

However, Baofeng-Huo, Guand, and Wang (2018) linked a negative relationship by using organisational capabilities to explore how supply chain flexibility promotes operational and economic performance. The study gathered data from 216 Chinese enterprises to test the conceptual model empirically. The findings imply that only customer or internal flexibility contributes to operational success directly, whereas supplier flexibility contributes to operational performance indirectly through internal flexibility. The three elements of SC flexibility have no direct implications on financial performance.

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The study also finds trade-offs between supplier and internal flexibility and complementarities between supplier and customer flexibility. However, no synergy effect is found for internal and customer flexibility on operational performance. This study provides a framework to understand supply chain flexibility from the organisational capability perspective. It identifies the inter-relationships among the three dimensions of supply chain flexibility and operational and economic performance

Generally, it can be observed from the empirical works discussed above that each study has some level of variations methodologically, conceptually, and geographically. There exist different contexts and other characteristics; environmental, managerial, economic and social cultural, among others, between firms, industries and even nations; hence, these findings cannot be relied upon for decision making regarding all firms. Moreover, none of the studies analysed how product flexibility can result to sustainable performance.

Modification flexibility and sustainable performance

The modification flexibility deals with adding value or modifying the pre-existing product to make a product more attractive to consumers. According to Kyeremah (2019), product modification has a positive relationship with gaining and sustaining market growth and improving overall performance. The study conducted to examine the supply chain flexibility of the Bottling Water Industry in Ghana focused primarily on the drivers of supply chain flexibility and their influence on the supply chain. The study extracted data from 45 respondents in the industry.

The result of the study indicated that existing products must be modified to attract customers. However, the study was marred by the narrow selection of the sample size and the inability to indicate the analysis level. The study used three companies and obtained 45 respondents for the study. Averagely, 15 respondents from each company which makes it invalid for a firm level analysis study. The question is, would these 15 people share a different view on the same organisation or otherwise? These drawbacks will be difficult for the study to generalise.

Similarly, Awwad, and Almahamid (2008) added to the view that modification flexibility has an impact on achieving organisational objectives, which include (becoming the market leader in the industry, improving industrial relations within the enterprise, higher level of customer satisfaction than rivals, higher product quality than rivals, growth in revenue, superior customer service and wider geographic coverage than rivals, provide good working conditions for its employees, providing solicit for the society in which they operate). The study assessed the relationship between modification flexibility and organisational objectives, thus sustaining its performance. The study adopted the quantitative approach, whereas a cross-sectional research design was employed with its questionnaire for data collection. The study used the director, vice-president, operations or production manager, and marketing manager in the Jordanian Manufacturing Companies classified in the Amman stock exchange market. The research utilised descriptive and analytical statistics for data analysis using simple regression analysis.

This result means that the modification flexibility construct is correlated with operational objectives construct more than their correlation

with strategic objectives construct. However, the study did not consider the effect of the moderating and intervening variables (such as firm size, business unit, organisational structure, and organisation location), which can influence the outcome on the relationships between modification flexibility and organisational objective.

Cheng (2021) also assessed the linkages between big data analytic capabilities, circular economy practices, and sustainable supply chain flexibility on sustainable supply chain performance. Based on the survey, 320 manufacturing firms were analysed in the Indian manufacturing firms. The study used a questionnaire for primary data collection; the study sampled 768 managers representing 422 manufacturing companies with valid responses, representing a 39.97% response rate. Partial least squares structural equation modelling (PLS-SEM) was applied through SmartPLS3.4.2 for empirical validation and reliability of the research model and identified the practices contributing to supply chain flexibility and its outcome on sustainable performance. The result indicated that supply chain flexibility especially medication flexibility has a positive relationship on sustainable performance. However, supply chain flexibility and sustainable performance were amalgamated to achieve sustainable performance. Also the sample size selection does not depict the population.

Angkiriwang, NyomanPujawan, and Santosa (2018) also examined manufacturing companies' uncertainty and relevant strategies to achieve better supply chain flexibility. The qualitative research approach was conducted based on a case study involving four manufacturing companies in Indonesia. The study used four manufacturing firms to assess whether environmental

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uncertainties can lead a firm to employ supply chain flexibility. The study's result highlights the importance of supply chain flexibility; specifically modification flexibility and how it enhances strategies for the organisation's overall performance. The results establish strategies which can improve supply chain flexibility and the pertinent objectives. This study, however, cannot be generalised because it failed to use a wider range of sample size for its analysis. Also, uncertainty typology may affect supply chain flexibility. Furthermore, the paper focused solely on uncertainty, which is not the only reason a firm, might adopt flexibility.

Muntaka, Haruna, and Mensah (2017) conducted a quantitative research in Ghana that positively links modification flexibility to supply chain performance. The study was conducted to explore the significance of integration and flexibility as critical determinants of business performance by examining the connection amongst supply chain integration and flexibility on the one hand and business performance on the other. The study used mainly a cross-sectional approach; structured questionnaire was used to collect responses from two hundred and fifty-five employees. The result indicated supply chain flexibility (modification flexibility) has a positive correlation supply chain performance. However, the study only used the manufacturing flexibilities to measure supply chain flexibilities.

It must be acknowledge that kyeremah seek to understand the relationship between modification flexibility and customer satisfaction in Ghana. However modification flexibility were conceptualised as cost. This could be responsible for the insignificance effect of the modification on the packaged water supply chain sustainable performance. No other study has

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looked at modification flexibility and sustainable performance in Ghana on geographical and industry terms to the researchers' knowledge.

Logistic flexibility and sustainable performance

To effectively and efficiently respond to changing customer needs, including the increasing demand for sustainable offerings, firms are forced to re-design their operational processes and implement flexible structures and processes across their supply chain. To increase responsiveness and eliminate bottlenecks across the supply chain, flexibility in operational and logistics activities should be inculcated. Thus, Jafari, Nyberg, and Hilletofth (2015) argued that the integration, coordination, and communication across both the inbound and outbound supply chain are necessary in gaining sustainable performance. The study examined how postponement is applied in retailing and how such application is connected to logistics flexibility. The study was conducted based on a case study involving three manufacturing companies in Sweden.

The study relied on qualitative data gathered on the retailers and secondary material on some suppliers, including logistics providers, for further insight. The study's results show that retailers have different practices regarding postponement and speculation; however, there is a growing tendency toward postponement among retailers by exploring new means of applying postponement connected to logistics flexibility. The results also revealed that higher postponement applications could be associated with higher logistics flexibility. Although there is a relationship, the study only focused on postponement as a factor for logistics flexibility. However, postponement is not the only factor of logistics flexibility. Thus, firms that

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take a speculative strategy may also attain logistic flexibility. The study did not look at how retail firms can sustain their overall performance. Again, this study relied only on three retail firms; hence cannot generalise its results to the whole retail industry.

Also, Zhang et al. (2005) considered that the increasing demand for a sustainable product often implies a shift from the sole focus on end customers towards considering earlier stages of the supply chain; the ability to share information with suppliers and customers is indispensable in the pursuit of sustainability performance. Hence, there was an indication that logistics flexibility positively impacts sustainable performance. The study examined a study on logistics flexibility, created a framework to understand it, and showed how it relates to customer satisfaction. The survey used a sample size of 273 from the Society of Manufacturing Engineers to develop valid and reliable instruments to measure logistics flexibility and test the relationships among the variables using structural equation modelling. The study focused on the ability of a firm to respond quickly and efficiently to changing customer needs in inbound and outbound delivery, support, and services.

The result stated that firms could achieve customer satisfaction by developing logistics flexibility, which enables quick replenishment of incoming materials, producing products at an affordable price, meeting consumer expected demand and rapid delivery of the finished product to consumers. Again, the result establishes that logistics flexibility enhances sustainable performance. However, both dependent and independent variables were used in measuring through a single respondent, which may introduce common method bias. This research, however, cannot be generalised since it

overlooked the total and direct effects of logistical flexibility on sustainable performance.

Similarly, Fantazy, Mukerji, and Kumar (2012) stated that there is direct positive relationship of logistic flexibility survey on organisational performance. The study conducted a survey on 115 small and medium size Canadian manufacturing firms. The survey's construct was used to test a theoretical model using structural equation modelling (SEM). The result indicated that there is a direct positive effect on the strategy. Also, the result indicated the total effect (direct and indirect) of positively influenced performance. However, the study narrowly defined logistics flexibility thus not all the dimensions of logistics flexibility were explained.

Again, Chandak and Dalpati (2019) supported that logistic flexibility is key for supply chain performance. The study pulled data from129 respondents in the automobile industry. The study's conclusion shows that supply chain flexibility (logistics flexibility) relates to supporting supply chain performance. Thus, to efficiently manage the supply chain, organisations need to adopt proper supply chain strategies and flexibility into supply management chain practices (Sufian et al., 2010). Hence, effective and efficient supply chain management is vital determinant to building and sustaining competitive advantage in the marketplace. The study used Smart -PLS models in testing its hypotheses. The result of this study may be contributing to the supply chain management knowledge in several ways. This study was to put into the knowledge on supply chain management performance by finding the impact of supply chain management flexibility and supply chain management performance. However, supply chain flexibility was vaguely defined, thus

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making it difficult to know the exact dimension that will lead to supply chain performance.

According to Gelhard and Delft (2015), companies that can flexibly allocate their resources are in a better position to deal with environmental changes, design more sustainable offerings (e.g., quality products), invest in manufacturing technologies that demand less energy or avoid toxic by-products, commit resources to new business opportunities, or reverse unproductive resource deployment (Bock et al., 2012; Zhou and Wu, 2010). Although supply chain flexibility is considered indispensable in responding to environmental changes, including the increasing demand to satisfy economic needs while simultaneously considering human welfare and ecological constraints. However, Nidumolu et al. (2009) indicated that it is unclear how this dynamic capability hence logistic flexibility translates into superior sustainability performance. Thus, does not have a direct relationship with sustainable performance.

Chang and Huang (2015) conducted an exploratory survey in Taiwan. The study assessed that delivery flexibility allows companies to be faster than their competitors or make a deadline when only some or none of their competitors can, resulting in a competitive advantage. The study also contributed to management principles for aligning suppliers for delivery flexibility so that they may respond rapidly to customer demands. However, the results show that the request strategy has a negative effect on delivery flexibility.

In general, the empirical studies reviewed above show that each research has some amount of methodological, conceptual, and geographical

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differences. Different settings and other features exist amongst organisations, industries, and even nations, including environmental, managerial, economic, and socio-cultural factors; hence, these conclusions cannot be used to make decisions about all firms and industries. Moreover, few studies used logistics flexibility to determine the total effect on sustainable performance. To the best of the researcher's knowledge, few studies have looked at supply chain flexibility and sustainable performance in Ghana in terms of geography and industry.

Control Variables

Firm size, Firm age and sustainable performance

Although firm sizes have long been recognised as a firm-specific variable (a set of variables that separate one firm's industry from another), empirical study on their relationships has been limited. This is since most studies control firm size, this is evident in the works of Wang, Zhang and Go (2018), which assessed the effect of firm size on sustainable supply chain practices and sustainable performance of the firms. The study drew data from 172 Chinese firms. The study suggested that large firms are more likely to act to improve resource efficiency, recycle, provide green products and services, and establish a more environmentally friendly management system than SMEs. Hence, firm size could affect the implementation of environmental and social practices, as larger firms have more available resources and receive greater environmental and social pressure than smaller firms. It was concluded that firm size has a positive effect on sustainable performance.

Crane and Matten (2014) analysed whether firm size has a relationship with sustainable performance in India.40 respondents participated in the

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stratified random sampling approach used to obtain the data, which was based on in-person interviews with firm owners and top managers and questionnaires distributed to them. The study's result indicated that bigger firms might require more resources to operate and might be competing to have control over scarce resources. While resources are limited, the competition to have control might be forcing firms to act unsustainably. It was concluded that there is a negative relationship between firm size and sustainable performance. Hence, these contradictory views have paved way to control this variable.

Conceptual Framework

The conceptual framework according Ravitch and Riggan (2017) suggested that a conceptual framework shows the alignment among the topic, research questions, data collection, data analysis, and the rigorousness and appropriateness of the procedures employed in the conduct of the study. Their ground breaking book *"Reason and gour: How conceptual frameworks guide research"* argued that reason and gour are essential elements of conceptual frameworks that build a researcher's argument for the topic and methods chosen in the study. The conceptual framework relates concepts, empirical research, and relevant theories to advance and systematize knowledge about related concepts or issues. Thus, a conceptual framework explains "why the topic one wishes to study matters and why the means proposed to study it are appropriate and rigorous" (Ravitch & Riggan, 2017).

This study's conceptual framework is grounded on the ideas gained from the resource based view theory and the dynamic capability view theory and the various empirical findings. The framework contains six variables: product flexibility, modification flexibility, logistic flexibility, sustainable

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performance, and two control variables, as indicated in the framework (*Figure 1*). Thus, the framework depicts product flexibility on sustainable performance as objective one, modification flexibility on sustainable performance as objective two and logistic flexibility on sustainable performance as objective three. The hypothesis establishes the relationships between the individual dimensions of supply chain flexibility and sustainable performance. These variables have their various measurement indicated in questionnaire at the appendix. Figure 1 depicts the proposed conceptual framework of this study.

Control
Firm Size
Firm Age

Product flexibility

Modification flexibility

H1a-H1c

H2a-H2c

Logistics flexibility

H3a-H3c

Sustainable Performance
Economic performance Social Performance Environmental performance
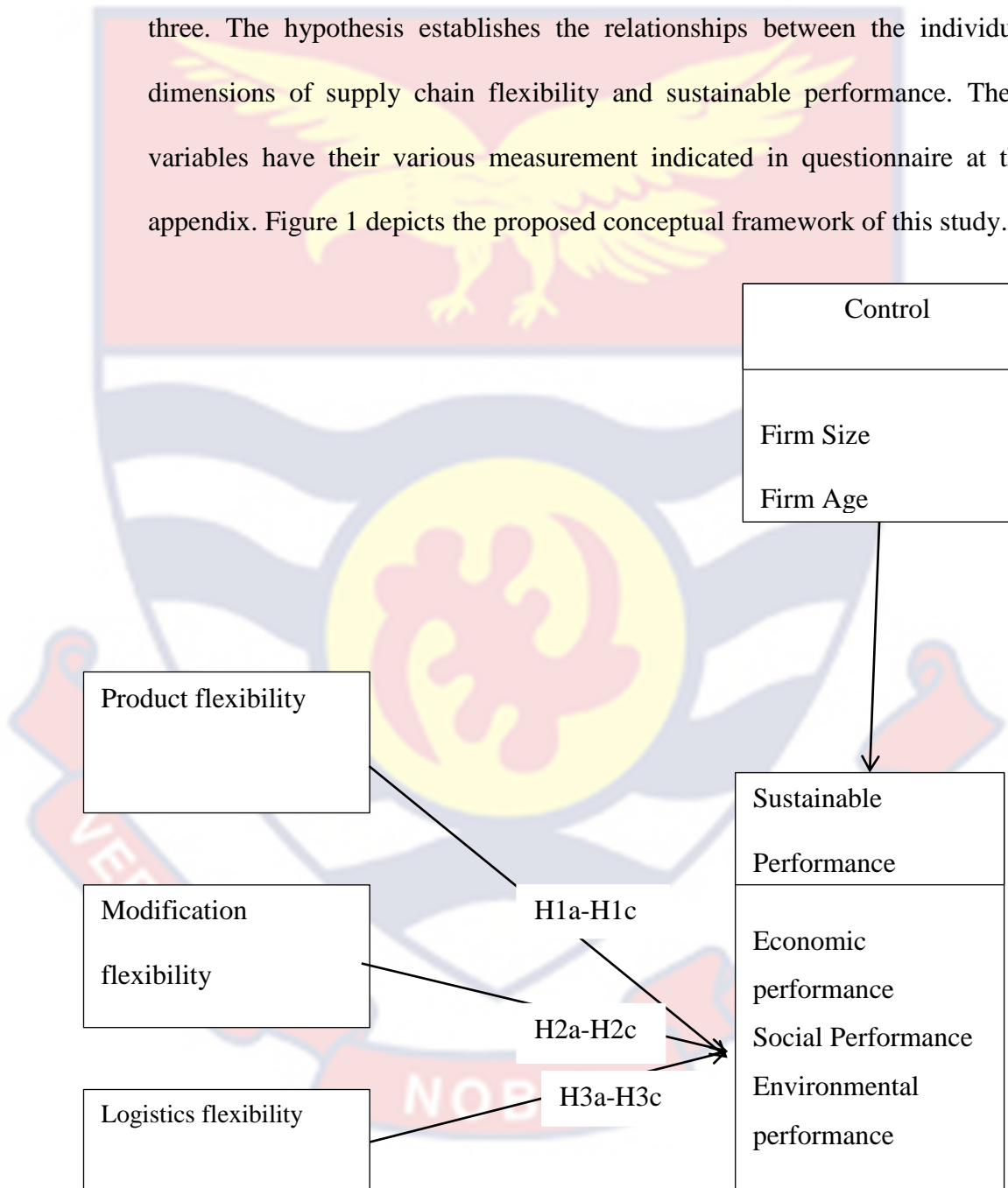
Figure 1: Conceptual Framework of the Study
Source: Author's Construct, Sekyiwa (2023)

Figure 1 show the construct used in the study, both the dependent and the independent variable with the control variable. The dependent variable which is sustainable performance and the independent variable supply chain flexibility. It is seen from figure one that the variables that makeup the independent variable is product flexibility, modification flexibility, and logistics flexibility. Again, figure one depicts the makeup of sustainable performance as economic performance, social performance, and environmental performance. Also it could be seen that supply chain flexibility directly affects sustainable performance. However, the researcher introduced a control variable to be held constant so that their presence dies not influence the outcome of the study.

Chapter Summary

This chapter was firstly introduced by theories adapted and employed in the study. Again it described the effect of the independent factors on the dependent variable and gave conceptual views on relevant concepts used in this study. Finally, the chapter constructed a conceptual framework based on the concepts discussed and proxies to measure the variables in the objectives of this study, as well as provide empirical evidence for the study.

CHAPTER THREE

RESEARCH METHODS

Introduction

The procedures or strategies used to find, select, process, and analyse information thus the approaches used to attain the study's aims will be discussed in this section. The research method will discuss the research design, research approach, definition, sources, and measurement of variables, justifications, and instrument validity, and data processing and analysis procedures. Again, it outlines the many scientific procedures that were employed to achieve the study's objectives. Finally, it will allow the researcher to assess the overall validity and reliability of this study**.**

Research Paradigm

As explained by Kuhn (1970), a research paradigm refers to "the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed. This is grounded on the idea of the positivism research paradigm. The positivist believed that truth exists and can be found (Crossan, 2003). The positivists argue that scientific research involves researching an observable social reality and finally making law-like generalisations as done by physical and natural scientists (Saunders, Lewis & Thornhill, 2012). Since the social reality is observable, it can be measured and quantified into variables.

Additionally, the positivism paradigm of research involves collecting data on the variables, analysing data by the use of statistical tests of significance, and affirming or rejecting hypotheses to make generalizations. The use of quantitative data also paves a way to further scientific research by

providing fair information accessible to researchers and aid them in making scientific assumptions (Johnson, 2014). The use of mathematics to represent and analyse features of social reality is consistent with the positivist epistemology, and a particular feature can be isolated and conceptualized as a variable.

This study is grounded on the idea of the positivism research paradigm because of the study objectives suggest numerical assessment of the variables. Also the positivist believe that truth is one, so to unearth this truth the researcher should be objective hence the identity of the researcher is not influenced by this study also this study involved in substantially collecting data on supply chain flexibility, and sustainable performance, and analysis of the data to establish relationships by using the statistical test of significance, and finally rejecting or failing to reject hypotheses to establish whether there is relationship between supply chain flexibility and sustainable performance in Ghana.

Research Design

The research design is the framework for conducting this study, thus it was influenced by the study's research questions, objectives, and aims. The purpose of a research design, according to Jang (1980), is to develop a research design that allows for reliable evaluation of cause and effect relationship between independent and dependent variables. To choose a research design there are numerous factors to consider which include the research question, the research instrument, and the time horizon. A research design according to Akhatar (2016) is categorized into exploratory, descriptive, explanatory, and experimental. The explanatory research design

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was adopted in this study. An explanatory study, according to Akhatar (2016), states the cause and effect and explains the relationship between variables thus the "why" factors. Also it helps gain familiarity in unknown areas. The explanatory research approach is used in this study to explain supply chain flexibility and sustainable performance in packaged water manufacturing firms in Ghana. Thus explanatory research, helped in analysing the study aims to evaluate research hypotheses that describe the nature and objective theories in order to accept or reject a hypothesis. It also helps understand the cause and effect between of the dependent on the independent variable.

Research Approach

Chetty (2016) defined research approach as a technique and strategy that consists of the steps of broad assumptions to detailed methods of data collection, analysis, and interpretation. It is a useful tool for increasing the credibility of social research argued by Crotty (1998). As indicated by Saunders *et al*. (2012), a research approach may be quantitative, qualitative and mixed. Saunders *et al*. (2012) again indicated that, the positivist research paradigm employs a quantitative research approach; hence this study employs a quantitative research approach. The study will employ the quantitative research approach because it examines the state of phenomenon and relationships among variables to test objective theories (Creswell, 2014). Also, Saunders *et al*. (2012) and Crossan (2003) postulated that the positivism research paradigm uses the quantitative research approach.

Creswell (2014) argued that quantitative researchers always deduce hypotheses or research questions, construct models based on the set of hypotheses, build in protections against bias, control alternative explanations

and finally generalise and replicate findings. This study employs the quantitative approach because it formulated hypotheses from theories and constructed models based on them. The quantitative approaches also enable the use statistical analysis that help analysed the study objectives.

Study Area

The study will be carried out within the Greater Accra Region. The Greater Accra Region is the national capital of Ghana, and the most populous and urbanized. Accra is located in the south-eastern part of Ghana bordered by Central Region on the west, Volta Region on the east, Eastern Region on the north and the Gulf of Guinea on the south. It has an estimated population of 5.4 million people inhabiting a land size of 3245km2 Ghana Statistical Service (2021). Major and specialized industries in Tema and Accra serve the economic needs of most parts of the country, the West African sub-region and beyond. The study concentrated on the packaged water manufacturing firms in Ghana because of its health, value and economic improvement kyeremah (2019). In Ghana, packaged water manufacturing firms are overseen by two government regulators, thus the Ghana Standard Authority (GSA) and the Food and Drugs Authority (FDA). The GSA maintains the standards firms should hold before operation, whiles the FDA ensures the hygiene requirement to be met by firms in their production Stoler et al, (2012). Producers registered with the GSA are permitted to use its seal of conformity, while as those producers registered with the FDA are given registration number. The study chose the Greater Accra Region because according to Ghana beverage report (2022) 80% of the bottled water manufacturing firms are located and operate in the Greater Accra Region and the remaining disperses in the 15 Regions.

Population

The study population, according to Issahaku, Ustarz, and Domanban (2013), is the sum of all individuals, elements, or situations about which a researcher seeks to make conclusions. It also refers to all members of a real or imaginary group of people, events, or things that a researcher seeks to generalize the study results to (Borg & Gall, 1989). As a result, according to Orodho (2008), defining the study's target population is critical since it aids researchers in making decisions about sampling and resources.

According to the Ghana Standard Authority website, there are 120 registered bottle water manufacturing firms in Ghana. Thus, this study will concentrate on the 120 bottle water manufacturing firms in the Greater Accra Region of Ghana.

Sample and Sampling Procedures

This study employs the census which involves all the 120 bottle water manufacturing firms located in Greater Accra Region. A census is employed in research where data is collected from each and every member of the population (Saunder *et al*., 2012). Also Zikmund, Babin and Griffin (2013) added that census is an investigation of the entire individual element that makes up a population, thus the whole population instead of a sample. The study employed census because of the small available data and satisfactory response rates are achieved.

Data Collection Instrument

This study employed structured questionnaire as the sole data collection instrument. The use of a questionnaire allows the study to acquire more accurate data for answering research questions and deciding whether to

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reject or not to reject the research hypothesis, which is in line with Osuala's (2001) opinion that "questionnaires permit wider coverage for a minimum expense both in money and effort." Using the research objectives as a beacon of light and some insights from the literature that are contained in this study's literature review, the study adopted and modified the questionnaire from (Cheng, Kamble, Belhad, Ndubisi, & Kharat, 2021; Kamble, Gunasekaran & Dhone, 2020; Kamble, Gunasekaran, & Dhone, 2020; Kyeremah, 2019; Kraft, Valdés, & Zheng,2018)

There are three sections in the questionnaire (A-C). Section A deals with the respondents' demographic features, Section B with the supply chain flexibility, and Section C with the respondents' sustainable performance (See Appendix). Closed-ended items or inquiries were utilized because they didn't require a lot of writing and hence didn't bore the replies. This also simplified data management, coding, and analysis. In addition, the respondents' questionnaire was chosen appropriately for the study since it allowed for a considerably faster collection of data from the population.

Because the constructs and the variables have been adopted and modified from previous studies, this study did not do pretesting of the instrument. However, the reliability and validity has been confirmed by peer review and expert judgement of the assigned supervisors. Furthermore, this study employs a confirmatory factor analysis to determine the validity of the instrument.

Data Collection Procedures

The data for this study was collected through self-administered questionnaire thus by hand or through emails based on organisations request.

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The researcher scheduled appointments with firms by phone calls and in person describing the study's aims and objectives, as well as the benefits the firms might gain from the study. The second visitation which was intended for data collection begun from 29th August to 3rd October, 2022 (Monday, 29th September from 9:00am to 5pm through to Monday, 3rd October thus only working days). When the researcher arrived at the companies premises, the researcher handed out ethical clearance from the institutional review board (IRB) for organisations to know the authencity of study to the receptionist, the receptionist then led the researcher to the various officers. Upon meeting the officers the researcher handed out the printed questionnaires to the respondents, in some instances, the researcher waits behind for the completed questionnaire. In other instances, the researcher had to leave and return for the completed questionnaire the next day when they are ready. However, some of the firms scanned the completed copied and mailed it to the researcher.

Sources of Data

This study employed primary data. The primary data were collected through a field survey in the various packaged water processing firms under study. Furthermore, the primary source data dealt with information collected directly from the designated respondents of the firms. The key representatives of the firms provided the data. These representatives include product/production manager, store manager, quality assurance manager, supervisor, procurement officer and any other senior staff available.

Data Processing and Analysis

The study will use Microsoft excel 2016, SmartPLS 4.0 and Statistical Package for Social Sciences (SPSS) to process the data. Structural Equation

Modelling (SEM) will be employed via SmartPLS 4.0. The selection and use of these data processing tools solely depend on their availability, appropriateness per statistical relevance and analysis, and the researcher's flexibility with them. The study employed this particular analysis as a result of the data and the specific objective's that the study seeks to achieve.

Data Analysis and Analytical Techniques

To begin with the analysis, the researcher audited the primary data gathered from the field to eliminate possible errors that respondents may have made. The study encoded the data to translate responses to questions into specific categories. The encoding helps to organize and reduce research data into manageable summaries. The data analysis was analysed using both descriptive and inferential statistics. The choice of a particular statistical technique was solely incumbent on the data and the specific objective that the study seeks to achieve from that data set. The selection of a particular descriptive statistics relies on its suitability and validity per statistical relevance.

Descriptive statistics used in this study were frequencies, percentages, mean, variances, and standard deviation. The study uses inferential statistics, such as t-test, regression, and correlation, to check the relationship between the dependent and independent variables and estimate the independent variables' effect on the dependent variable. The study presents the results in the form of tables, charts, and graphs where applicable.

Control Variables

Control variable influences the connection between the independent and dependent variable; it states overall effect, that is, either under cast or

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overcast. According to Allison (1999) establishing how an effect on a dependent variable associated with a particular independent variable happens owing to the link between that independent variable and other independent variables (control variables). In this study, sustainable performance (dependent variable) is known in the existing literature to have several explanatory variables .The study will control firm size, and firm age. This is because the literature holds that these variables can either under cast or overcast the effect on firm sustainable performance.

Intuitively, small firms are reluctant to involve or engage in sustainable activities due to the fact that they lack significant human and financial resources as compared to large firms, thus because the business environment is full of uncertainties, smaller firms gear their scarce resources toward its survival. Empirical evidence from studies, confirms that larger firms indulge in sustainable activities as compared to smaller firms (Lopez, Antelo & Fernadez, 2020; Wang, Zhang & Goh, 2018). However, Lin and Yip (2019), and Panda and Navak (2019) revealed that small firms can use their scarce resources in engaging sustainability to help them gain trust and market from their customers.

Also firms are more conducive to the economic performance as start-ups, however as a firm grows the firm consciously fulfills its corporate social responsibility and also have requisite resources to fulfill the environmental and social performance. Again, evidence from studies indicated that firms tend to be sustainable in their activities as they grow because many firms see sustainability as a cost, thus, if there is little or no predictable cash flows , firms will be reluctant to invest in sustainability (Badulescu, Badulescu,

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Saveanu & Hatos, 2021; wang et al., 2018). This inconclusiveness in the extant literature even made it a prerequisite to controlling these variables when dealing with sustainable performance in scientific research. As such, this study controlled firm size and age.

Validity and Reliability

The study used the following analytical validity and reliability checks to ensure robustness of the results. The study checked for Common Method Variance (CMV) using Variance Inflationary Factor (VIF) in Structural Equation Modelling (SEM). Hair et al. (2021) suggested a threshold of lesser than 5. Content Validity was examined through cross-loadings and depicted Confirmatory Factor Analysis (CFA). Convergent validity was assessed using Average Variance Extracted (AVE), while Discriminant validity was examined using Heterotrait-Monotrait ratio of correlations (HTMT). Also, predictive relevance of the model was measured using PLS predict in PLS-SEM as posited by (Shmueli et al., 2016).

Variable and Measurement

This study's variables were measured using constructs that were entirely new and developed by the researcher based on the concepts and theories reviewed. Others were adopted and modified from existing research works in the field.Firm age has been found to have a relationship with firms sustainable performance; hence, firms of a higher age are more likely to invest and perform better (Andam & Asante, 2018). Therefore, this study hypothesized that a firm's age is positively related to its sustainable performance. This variable (AGE) is specified as the firm's age in years as at the time of this study.

Firm size affects its flexibility. As the firm size increases, expenditure, monitoring, relationship, among others, also increases. As firms grow in number, firms tend to be bureaucratic and thus be inflexible, whereas small firms tend to be flexible in their operations because the numbers of employees are few and less bureaucratic. However, available literature holds that larger firms have more advantages in terms of acquiring finances, good labour force, and other assets that help increase their productivity. Therefore, firm size is expected to have a negative effect on flexibility. This variable firm size (FSize) is specified as the number of employees of the firm.

The details of the other variables and their measurement are presented in Table 1. Table 1 contains the variables, their measure, the instrument, and the empirical justification for the measurements and the variables.

Table 1: Variables and their Measurement

Variable	Measurement	Data source/ Instrument	Empirical Justification
Sustainable performance	Social performance Economic performance Environmental performance	Questionnaire	Zhu, Geng, and Lai (2010); Kraft, Valdés, and Zheng,(2018); Kamble, Gunasekaran, and Dhone (2020); and Cheng, Kamble, Belhad, Ndubisi, and Kharat (2021).
Supply chain flexibility	Constructs will be adopted and modified from Vickery *et al*, (1999); and Kyeremah (2019).	Questionnaire	Vickery, Calantone, and Dröge, C. (1999); and Kyeremah (2019).

Source: Field Survey, Sekyiwa (2022)

Ethical Considerations

This study took into consideration the ethical issue that was identified in a study by (Patten, 2017). The main ethical concerns are voluntary involvement, the right to privacy, anonymity, and information security. To handle all of these ethical issues, effort was made to ensure the effectiveness of these ethical considerations. The following activities was done, regarding voluntary participation, each respondent was chosen whether or not to take part in the data collection operation. The concern of anonymity is further addressed by prohibiting respondents from submitting details about themselves in the survey, such as names, phone numbers, and home addresses. Additionally, respondents were guaranteed that their identities wouldn't be disclosed or utilized for anything other than this open analysis. Also, respondents were reassured that the information would be used solely for academic purpose. Finally, respondents were guaranteed that all information submitted will be kept anonymous to protect the data's confidentiality.

Chapter Summary

This chapter discussed the assessment of supply chain flexibility on sustainable performance of packaged water manufacturing firms in Ghana. Systematically, procedures were employed to achieve the objectives of this study. It examined the research paradigm, research design, the research approach, the study area, sample and sampling procedures, data collection instruments, data collection methods, data processing tools and data analytical framework, variable description, measurement, and justification.

The study employed the quantitative research approach and adopted the explanatory research design to explain the cause and effect relationships

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between the variables. Because this study employed the quantitative approach, questionnaires were used to solicit primary data from the field. The data were entered into the Structural Equation Model (SEM) for analysis. It is important to mention that the study employed a structured questionnaire, which does not give room to the respondents to give extra views on the topic. However, this does not have any adverse effect on the results of the study because the items presented in the questionnaire were results of extensive literature review and expert judgments.

Also, the questionnaire does not discriminate against the illiterate population. Again, this does not affect the work's quality because the data was obtained fairly from all the packaged water manufacturing firms (bottled water) in Greater Accra Region. It is essential to mention that the study used 120 packaged water manufacturing firms (bottle water) in Ghana.
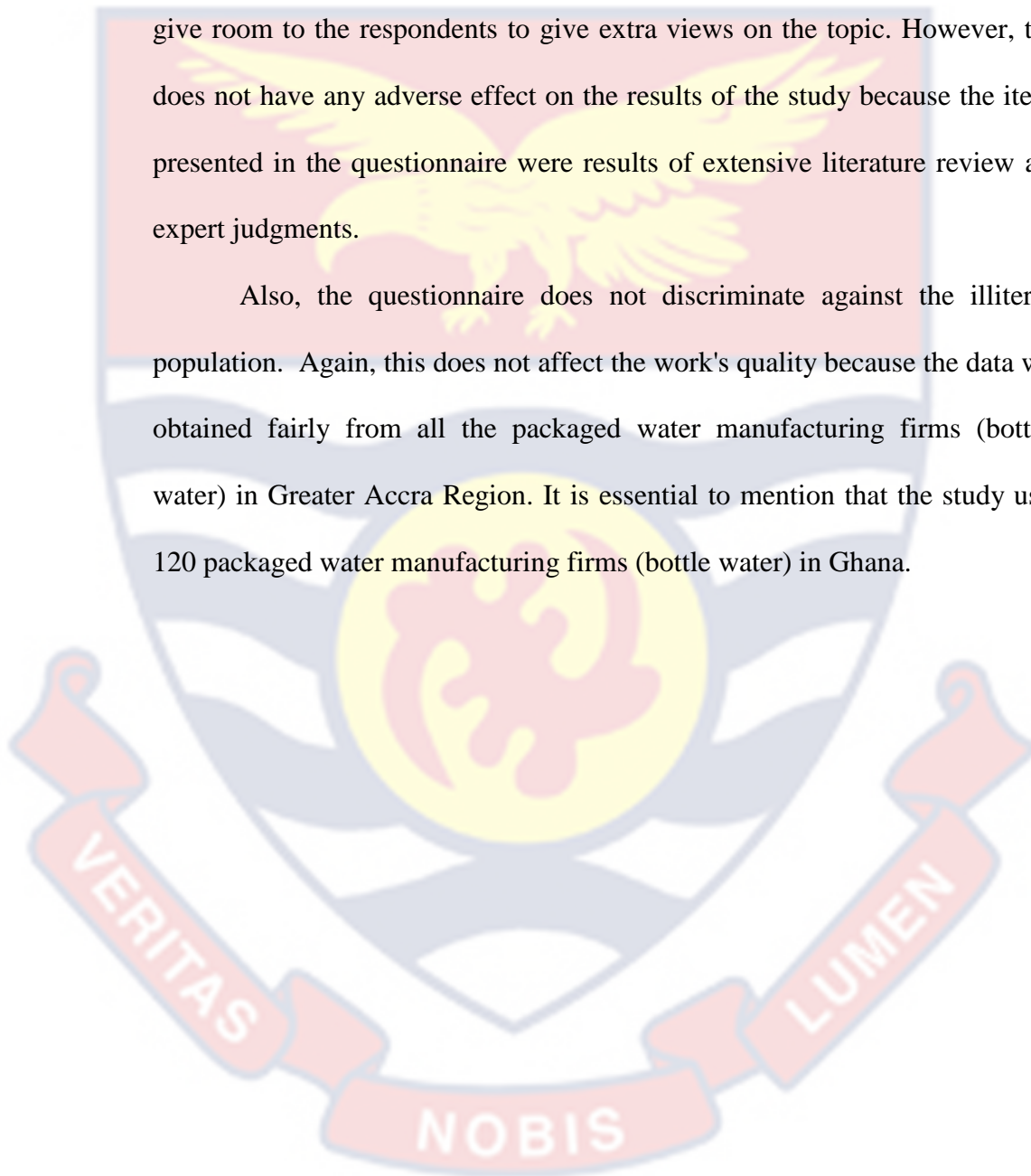
CHAPTER FOUR

RESULT AND DISCUSSION

Introduction

This section presents the findings of the study in line with study objectives. This section starts with describing the characteristics of the variables or various elements in the instruments that were used to gather data for this study. The next part examines the data's validity and reliability to serve its purpose by offering indicators such as Common Method Variance Bias or Common Method Bias, confirmatory factor analysis, and others. The objective's findings were also presented. This part presents structural equation modelling as a robustness check and as required by this study to investigate the whole model and test the theoretical premises supporting this investigation.

It is important to note that 120 employees were interviewed at the end of the data collection process.
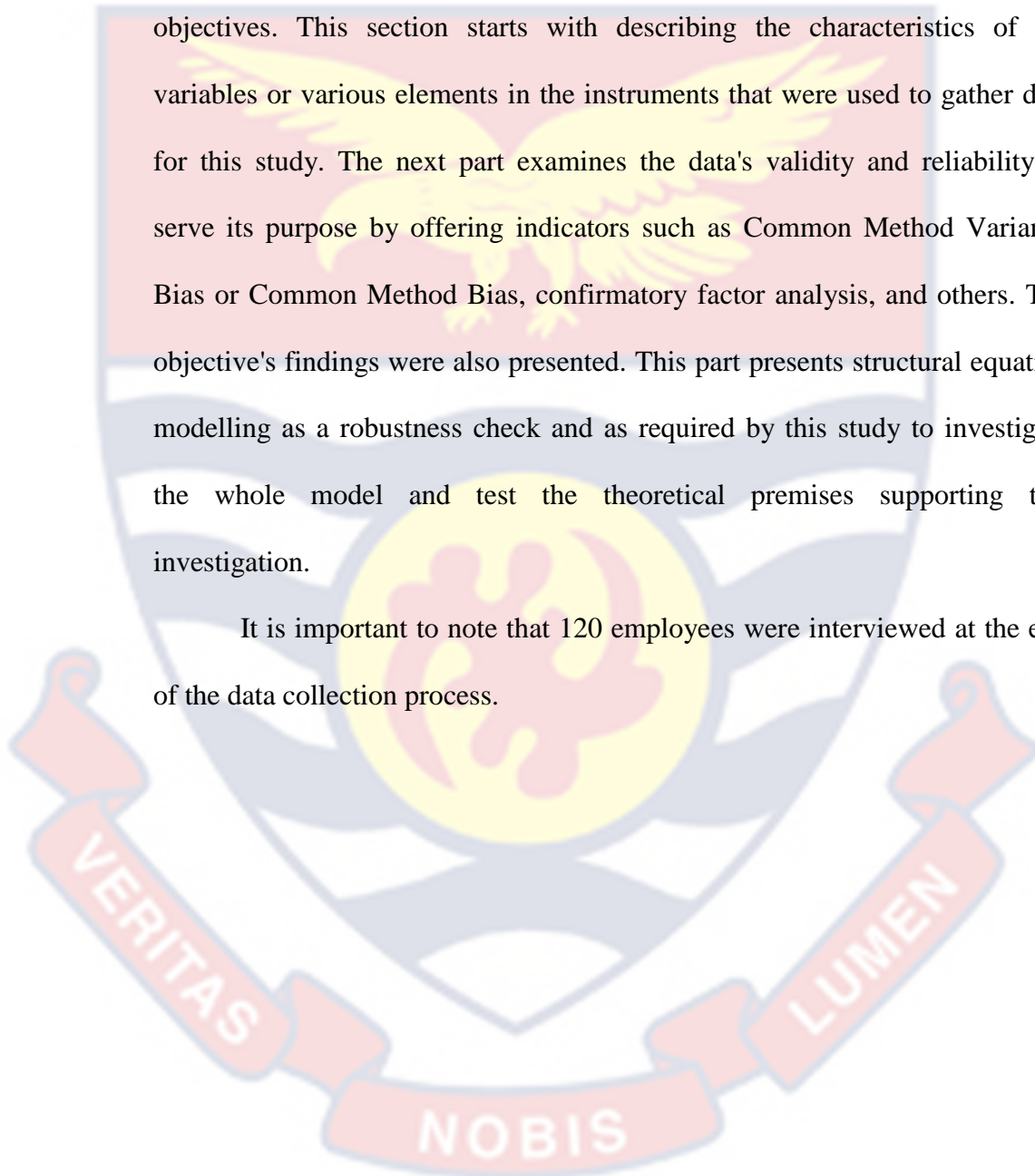
Table 2: Demographic Characteristics of Respondents

Variables	Options	Frequency	Percentage (%)
Gender	Male	54	45.0
	Female	66	55.50
Total		120	100.00
Highest level of education	Basic	10	8.3
	Secondary	28	23.3
	Tertiary	82	63.3
Total		120	100
Managerial Role	Manager	20	16.7
	Production manager	16	13.3
	Quality officer	24	28.3
	Supervisor	42	35.0
	Others	4	6.7
Total		120	100.00
Firm size	Micro scale ENT	10	8.3
	Small scale ENT	42	35.0
	Medium scale ENT	52	43.3
	Large scale ENT	16	13.3
Total		120	100.00
Age of firm	Less than 6 years	90	28.10
	6 – 10 years	96	30.00
	Over 10 years	89	27.80
		45	14.10
Total		120	100.00

Source: Field Data, Sekyiwa (2022)

Descriptive Statistics

This section describes terms that are used to define the fundamental characteristics of data in this study. Objects that can be measured using the same descriptive statistics are put together in one table, but under different titles. The relevance of statistical significance informed the selection of statistical techniques. The groupings, on the other hand, are meant to reduce the number of tables in order to improve the final product's appearance. Table 2 presents descriptive statistics on background characteristics as contained in the instrument. Again, table 2 were used to present the demographics of the respondents. As contained in Table 2, there were 54 males constituting 45.0%

of the total number of respondents as against 66 females constituting 55.5% of the total number of respondents. Most of the respondents were females, which may imply that there are more females in position andwere willing to participate in survey comparing to more males participated in the survey.

On firm age brackets, the results showed that majority of the firms have been in a existence within 6 to 10 years (96, representing 30.00% of the total responses gathered). This was followed by less than 6 years which pooled 90, representing 28.10% of the total responses gathered, over 10 years which recorded 89 out of 120, representing 27.80% of the total response.

Table 2 again shows that, majority of the respondents are in/have reached or completed tertiary or equivalent in education (82, representing 63.3%). This was followed by secondary or equivalent (28, representing 23.3%), and those who completed basic school or equivalent (10, representing 8.3%). This distribution shows that the respondents are knowledgeable and can read and write, making the approach for the data collection used in this study appropriate.

According to the table, majority of the firms are medium scale enterprise which consisted of 52 respondents, representing 43.3% of the total responses. This followed by small scale enterprise which consisted of 42 respondents, representing 35.0% of the total sample size. Followed by large scale enterprise which consisted of 16 respondents, representing 13.3% of the total response rate. Last but the least, micro scale enterprise which consisted of 10 respondents, representing 8.3% of the response rate.

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Measurement Model

Quality of the constructs in this study is assessed based on the evaluation of the measurement model. The assessment of the quality criteria starts with the evaluation of factor loadings, followed by establishing construct reliability and construct validity. Firstly, to guarantee that each indicator is valid and dependable, the outer model (measurement model) was evaluated using confirmatory factor analysis via two stage approach in Smart PLS, to examine the objectives of the study. According to Hair et al. (2019), the two stage approach helps reduce the number of path model relationship hence achieving model parsimony. The study based its justifications on principles of (Khan, Sarstedt, Shiau, Hair, Ringle & Fritze, 2019, Gaskin et al., 2018 & Hair et al., 2017).

The study followed the views of Hair et al. (2017) to test the model developed using a two-step approach. First the lower order constructs which focused on the relationship between product flexibility on economic performance, product flexibility on social performance. Product flexibility on environmental performance, modification flexibility on economic performance, modification flexibility on social performance, modification flexibility on environmental performance, logistics flexibility on economic performance, logistics flexibility on social performance and logistics flexibility on environmental performance.

The study first checked the outer loading to determine whether the indicators adequately measure the construct. Again the study tested for validity and to determine the reliability of the instruments, and then discriminate validity was examined how distinct the construct are from each

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other. Next, path co efficient was tested to assess the relationship between constructs. The effect size was also tested to know the extent of change in the relationship among constructs. Coefficient of variation was tested to assess the change in latent variable relating to its total variance

Validating Lower Order construct

This section shows the findings of the outer loadings, reliability and validity test, the researcher calculated the PLS Algorithm to obtain factor loading and Average variance Extracted(AVE) to assess each dimensions internal reliability, hetertrait-monotrait ratio of correlation (HTMT) to assess discriminate validity,

Outer Loadings

Factor loadings are done to assess the quality of the indicators measuring each construct within the context of the study. Again, it refers to the extent to which each item in the correlation matrix correlate with the given principal component. According to Hair et al. (2007) the item loading should be greater than 7 hence a loading less than 7should be eliminated from the research model. The figure 2 below present the outer loadings of the first order construct. It was shown by the outcome that the factor loading values are greater than 0.70, thus, those indicators of the variable are considered valid as it met the minimum threshold of 0.70.Fig. 2 shows that all of the measuring items loaded are above the acceptable threshold set by the various authors for the application and evaluation of PLS-SEM results in marketing research (Acquah, 2020; Hair et al., 2019), that is a minimum loading of 0.705 and 0.930 as the maximum loading.

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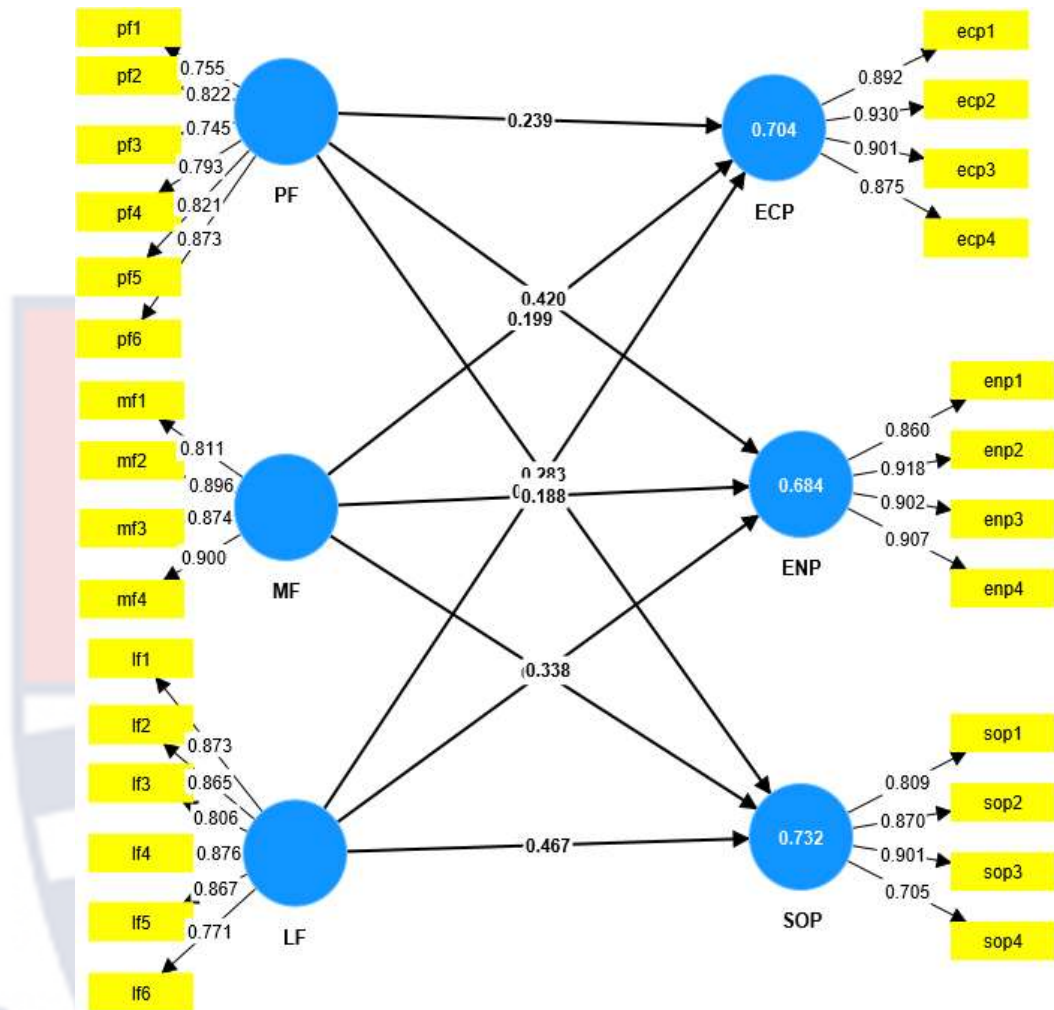
Figure 2. Factor loading for first order or reflective construct

As a result, the ultimate model provided above (Figure 2) represents the base

for which further examination of the structural model is carried out.

Internal Consistency for Lower Order Construct

Table 3 depicts the evaluation of reliability and consistency statistics of

the first order constructs, thus the internal reliability Cronbach's alpha (α),

composite reliability (Rho_c), as well as reliability indicator (Rho_a) are used

to assess the study's construct's reliability. The rule of thumb for all the

reliability criteria is that they must be greater than 0.70 (Sarstedt *et al*., 2022).

As presented in the table 3, all items used to measure the various construct

loaded above 0.70 or more for Cronbach alpha (i.e., 0.84 as the minimum

indicator loading and 0.921 as the highest of the measurement items), thus meeting the first criterion for internal consistency reliability. Thus result indicated that all latent variables have met the threshold of 0.70, which suggest that the entire latent variables are reliable for the model

Table 3: Internal Consistency and Validity

	Cronbach's Alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
ECP	0.921	0.924	0.944	0.81
ENP	0.919	0.922	0.943	0.805
LF	0.919	0.919	0.937	0.712
MF	0.894	0.901	0.926	0.758
PF	0.889	0.895	0.915	0.644
SOP	0.84	0.853	0.894	0.68

Source: Field Data, Sekyiwa (2022)

Again, evaluating indicator reliability can be assessed by composite reliability (rho_a) according to Benetez, Henseler and Schberth (2020). Other researchers also recommended composite reliability is more reliable to test the reliability indicator. As shown in table 2, rho_a is greater than of 0.70 which is its threshold as posited by Hair *et al* (2014). Specifically, ECP was 0.924, ENP 0.922, LF 0.919, MF 0.901, PF 0.895, and SOP 0.894

Convergent validity

Convergent validity is frequently measured using Average Variance Extracted (AVE) in PLS-SEM model as posited by Hair et al, (2020). According to Taherdoost (2016), convergent validity describes the extent to which two metrics of concepts that ought to be related philosophically are actually related. The AVE is calculated by averaging a construct's indicator reliabilities. The average variance shared by the concept and its individual

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measurements is analysed by this metric. The criterion for AVE is that the value must be 0.5 in numerical terms or 50% in proportionate term or greater (Sarstedt et al., 2019; Fornell & Larcker, 1981). The AVE values in the table 3 shows that there is no convergent validity problem because all constructs scored an AVE score greater than the Fornell and Larcker (1981) criterion of 0.5. Specifically ECP was 0.81, ENP 0.805, LF 0.712, MF 0.758, PF 0.644, and SOP 0.68.

Table 4: Multicollinearity Values

	VIF
ecp1	2.955
ecp2	4.023
ecp3	3.059
ecp4	2.667
enp1	2.286
enp2	3.556
enp3	3.522
enp4	3.812
lf1	3.297
lf2	3.251
lf3	2.079
lf4	3.894
lf5	2.92
lf6	1.897
mf1	2.109
mf2	3.1
mf3	2.56
mf4	3.032
pf1	1.806
pf2	2.29
pf3	1.842
pf4	2.052
pf5	2.208
pf6	2.791
sop1	1.968
sop2	2.566
sop3	3.101
sop4	1.486

Source: Field Data, Sekyiwa (2022)

Multi collinearity among Exogenous Variables

The Variance Inflation Factor (VIF) statistic is utilized to assess multicollinearity in the indicators. According to Hair et al. (2016) multicollinearity is not an issue if values are less than 5. Table 4 shows the variance inflationary factor (VIF) to check for multi collinearity and common method bias. It also shows that all VIFs resulting from the full collinearity test are lesser than 5 depicting that the model is free of common method bias.

Discriminant validity

The uniqueness of a construct is measured by DV. Whenever the amount of variance inside a construct (AVE) surpasses the shared variance between the constructs, discriminant validity is proven. The Fornell Lacker criterion was used in evaluating the discriminant validity, where it was explained that DV ensures that the latent variables of the sample are truly different from each other. It is also used to check the structural model for problem with collinearity. According to Fornell and Lacker (1981), the factor loading should be greater in their individual construct than between the latent variable. It was also stated that discriminatory validity is established when the square root of AVE of the construct is greater than the correlation with all other constructs of the study thus square root of AVE (in bold) for the construct was found greater than the correlation with other construct (table 4) hence providing strong support for the establishment of discriminant validity.

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Table 5: Fornell –larker Criterion

	ECP	ENP	LF	MF	PF	SOP
ECP	**0.9**					
ENP	0.885	**0.897**				
LF	0.786	0.708	**0.844**			
MF	0.73	0.719	0.72	**0.871**		
PF	0.661	0.738	0.561	0.686	**0.803**	
SOP	0.821	0.835	0.786	0.753	0.698	**0.825**

Source: Field Data, Sekyiwa (2022)

Structural Model of Lower Oder Construct

The study proceeded to test the hypothesis after the measurement model satisfactorily approved by PLS-SEM. The following criteria was considered coefficient of determination(R^2), statistical significance and relevance of path coefficient and also models out-of sample predictive power using PLS predict procedure were evaluated in order to supplement the quality of the study objectives examined

Significance of Path Coefficient

The study assessed the hypothesis by evaluating the various dimension of supply chain flexibility on sustainable performance. The study concentrated on packaged water manufacturing firms in Greater Accra Region and the Eastern Region of Ghana. According to Hair et al. (2016) for the path model, 5000 replications were used for bootstrapping analyses the path coefficient that measures the direction, intensity and degree of significance with t-statistic. Table 6 below describes the results of the hypotheses studied using PLS- SEM.

Table 6: Results for Structual Equation model and hypothesis testing (LOC)

Structural paths	B	T stats	P values		Decision Rule
LF ->ECP	0.786	19.166	0.000	**P<0.05**	H[1a] (supported)
LF -> ENP	0.712	14.048	0.000	**P<0.05**	H[1b](supported)
LF -> SOP	0.795	21.201	0.000	**P<0.05**	H[1c] (supported)
MF -> ECP	0.733	13.25	0.000	**P<0.05**	H[2a](supported)
MF -> ENP	0.722	12.729	0.000	**P<0.05**	H[2b](supported)
MF -> SOP	0.755	14.347	0.000	**P<0.05**	H[2c](supported)
PF -> ECP	0.663	8.305	0.007	**P<0.05**	H[3a](supported)
PF -> ENP	0.74	11.093	0.000	**P<0.05**	H[3b](supported)
PF ->SOP	0.708	10.081	0.000	**P<0.05**	H[3c](supported)

Note: = P <0.05 Source: Field Data, Sekyiwa (2022)

Discussions of hypothesis

This sub section discusses the hypotheses underlying the effect of product flexibility on the individual dimensions of sustainable performance

Product flexibility and the dimensions of sustainable performance

H1a states that product flexibility has a positive and significant effect on economic performance. From table 6 the findings show that product flexibility has a positive and significant effect on economic performance with (β= 0.663; t stat= 8.305; p-value= 0.000). The reason being that the t-stat (8.305) thus H[1a] is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in product flexibility would result to 83.05% improvements in economic performance.

H[1b] states that product flexibility has a positive and significant effect on environmental performance. From Table 6 above, the findings show that product flexibility has a positive and significant effect on environmental performance with (β= 0.74; t stat= 11.093; p-value= 0.000). The reason being

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that the t-stat (11.093) for H^{1b} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in product flexibility initiatives would result in 74 % improvements in environmental performance.

H^{1c} states that product flexibility has a positive and significant effect on social performance. From Table 6 above, the findings show that product flexibility has a positive and significant effect on environmental performance with (β= 0.708; t stat= 10.081; p-value= 0.000). The reason being that the t-stat (10.081) for H^{1c} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in product flexibility would result in 70.8% improvements in social performance.

Modification flexibility and the dimensions of sustainable performance

H^{2a} states that modification flexibility has a positive and significant effect on economic performance. From Table 6 above, the findings show that modification has a positive and significant effect on economic performance with (β= 0.733; t stat= 13.25; p-value= 0.000). The reason being that the t-stat (13.25) for H^{2a} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in modification flexibility initiatives would result in 73.3% improvements in economic performance.

H^{2b} states that modification flexibility has a positive and significant effect on environmental performance. From Table 6 above, the findings show that modification flexibility has a positive and significant effect on environmental performance with (β= 0.722; t stat= 12.729; p-value= 0.000).

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The reason being that the t-stat (12.729) for H^{2b} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in modification flexibility would result in 72.2% improvements in environmental performance.

H^{2c} states that modification flexibility has a positive and significant effect on social performance. From Table above, the findings show that modification flexibility has a positive and significant effect on social performance with (β= 0.755; t stat= 14.347; p-value= 0.000). The reason being that the t-stat (14.347) for H^{2c} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in modification flexibility is as a result of 75.5% improvements in social performance.

Logistics flexibility and the dimensions of sustainable performance

H^{3a} states that logistics flexibility has a positive and significant effect on economic performance. From Table 6 above, the findings show that logistics flexibility has a positive and significant effect on economic performance with (β= 0.786; t stat= 19.166; p-value= 0.000). The reason being that the t-stat (19.166) for H^{3a} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in logistics flexibility result in 78.6% improvements in economic performance

H^{3b} states that logistics flexibility has a positive and significant effect on environmental performance. From Table 6, the findings show that logistics flexibility (0.347; p-value= 0.000). The reason being that the t-stat (14.347) for H^{3b} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the

researcher failed to accept the null hypothesis. From β, it can be derived that a rise in process logistics flexibility result in 75.5% improvements in environmental performance

H^{3c} states that logistics flexibility has a positive and significant effect on social performance. From Table 6, the findings show that logistics flexibility has a positive and significant effect on social performance with (β= 0.795; t stat= 21.201; p-value= 0.000). The reason being that the t-stat (21.201) for H^{3c} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in logistics flexibility results in 79.5% improvements in social performance.

Model Specification Higher Order construct

Higher order construct provides framework so that model can be constructed based on a more abstract dimension known as higher order construct which concentrate more on sub dimensions known as lower order component Hair et al. (2019). Sustainable performance was the higher construct in the study based on three lower order construct Economic, Social and Environment. In order to establish the higher order construct validity, first of all the researcher calculated the PLS Algorithm to check the significance of the outer loading. Loadings above 0.70 are recommended, since they indicate that the construct explains more than 50 percent of the indicator's variance, thus providing acceptable item reliability (Hair et al., 2019). According to table 7, it was revealed that the outer loading is greater than 0.70 (i.e. 0.92, 0.919 and 0.945).

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Again, VIF was assessed to check collinearity, all VIF values were less than the recommended value of 5 (Hair et al., 2016) since all criterion were met, the higher order validity was established.

Outer Weight, outer loadings, and VIF, thus the outer weights were found significant (Hair et al., 2016).
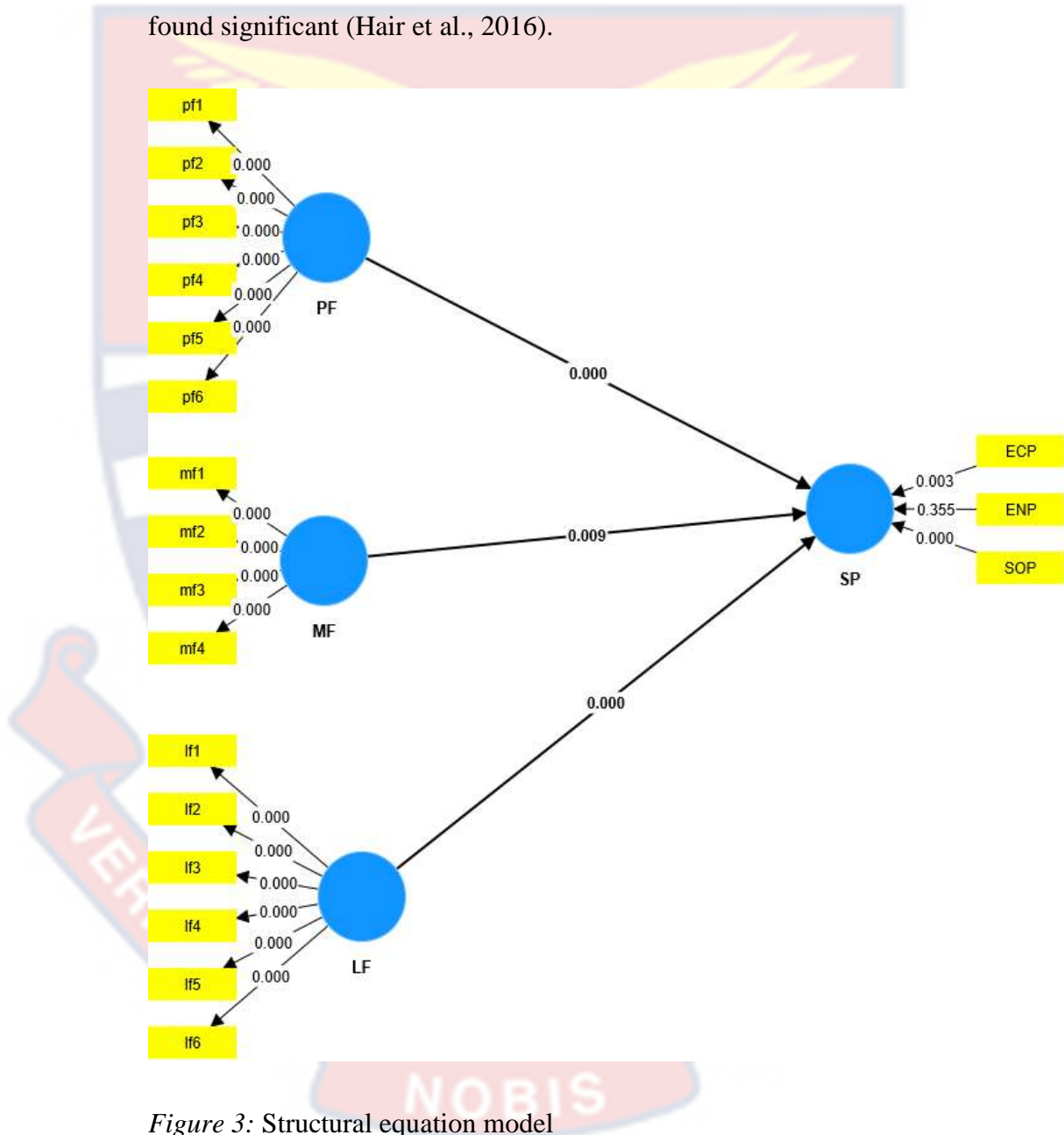
Figure 3: Structural equation model

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Table 7: Higher Order Construct Validity

HOC	LOC	Outer Weights	T-statistics	P- values	outer	VIF
SUSP	ECO	0.390	3.010	0.003	0.942	3.450
	SOC	0.126	2.545	0.011	0.919	3.232
	ENV	0.537	5.287	0.00	0.945	3.672

Source: Field Data, Sekyiwa (2022)

Internal Consistency of Reliability for Higher Order

Internal consistency of reliability can be the internal reliability (Cronbach's Alpha), reliability of indicator (Rho_a) and composite reliability (Rho_c). Internal reliability is achieved by the outcomes of Cronbach alpha (α). For IR, the rule of thumb is that the threshold should be > 0.7 for any given predictor (Sarstedt et al., 2021; Hair et al., 2019). Whilst Hajjar (2018), shows that internal reliability is achieved when the Alpha value of the Cronbach is 0.6 or more. From Table 8, Cronbach's alpha (α) showed the following: PF= 0.889,MF 0.894 and 0.919,respectively. The results indicate that all latent variables have met the thresholds of the latent variables (> 0.70), suggesting that all latent variables were reliable for the model.

Table 8: Internal Consistency of Reliability for Higher order Construct

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted(AVE)
LF	0.919	0.919	0.937	0.712
MF	0.894	0.901	0.926	0.758
PF	0.889	0.895	0.915	0.644

Source: Field Data, Sekyiwa (2022)

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According to Henseler (2017), the reliability of the indicator (IR) is an important method for the uni-dimensionality assessment of a collection of measurement variables. Benitez et al. (2020), posit that the use of rho A for testing indicator reliability has also been suggested by other studies. The reason being that Rho-A is a much more reliable test of the reliability of the predictor. Ringle et al. (2020), proposed that the rho A (a) rating should be > 0.70. From Table 8, the rho_a values are PF= 0.895, MF 0.901 and LF= 0.0.919, suggesting satisfactory and acceptable outcomes. Ringle et al. (2020), demonstrated that composite reliability (CR) measures the degree to which, when placed together, a particular variable is properly assessed by its indicators.

This implies that, to have a good reciprocal correlation, CR requires that all the indicators assigned to a given construct are reliable. Çankır (2017), stress that using the composite reliability, the construct reliability result was obtained, since it is ideal for evaluating the extent to which a given indicator consistently measures its underlying latent variable. The thumb rule is that 0.70 or higher should be the acceptable CR value (Ringle et al., 2020; Çankır, 2017). From Table 8, it was revealed that the minimum CR value equals 0.915, thus, all CR values were > 0.70. This implies that with their respective constructs, all the assigned metrics had close reciprocal relationships.

Robustness and Sensitivity Test

This section presents the control variable; table 9 below presents the full model report with control variable or the exogenous variables that may hold alternative explanations for the independent variable. This study controlled exogenous variable such as firm size and firm age to hold

alternative explanations for the independent variable. All the models estimated in this study contain sustainable performance as a dependent variable. As expected, the entire control variable has varying degrees of effect on the endogenous variable.

However, all the effects have a very minimal and insignificant effect, from the table; firm age has less than one per cent effect thus - 0.057 on sustainable performance. This means that there is an inverse relationship between firm age and sustainable performance, a unit change in this variable will lead to a less than one per cent change in sustainable performance. This depicts practically that as firms grow and obtain market share, inculcating in flexibility is not feasible and thus their activities are not sustainable. On the other hand, firm size has 6.9% effect on sustainable performance. This means that a change in firm size will lead to 6.9% increase in sustainable performance. Since these effects of the exogenous variable are not significant, the high effect of the independent variable on the dependent variable in the models is not due to the influence of exogenous variables.

Table 9: Full model report with control variable

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Firm Age->SP	-0.057	-0.058	0.051	1.116	0.25
Firm Size ->SP	0.069	0.071	0.045	1.54	0.4
LF -> SP	0.501	0.503	0.075	6.698	0
MF -> SP	0.213	0.211	0.084	2.545	0.01
PF -> SP	0.293	0.294	0.081	3.61	0

Source: Field Data, Sekyiwa (2022)

Effect Size

The reboustnesstest alsopresents a sensitivity analysis of the effect size (F-squareF^2) statistics of the model. Wong (2016) and Lowrey and Gaskin (2014) argue that the F^2 test assess the effect of a specific exogenous construct if deleted from the model. Cohen (1988) pointed out that F^2 values of 0.02,0.15 and 0.35 are explained as small, medium and large. In view of table 10, Logistics flexibility had a larger and significant effect on sustainable performance with value 0.575 which is higher than 0.5 thresholds, product flexibility had medium and a significant with value 0.35 and modification flexibility had small significant effect on sustainable performance depicting the value of 0.81 from table 10 below. However, from table 10 the exogenous (control) variable had insignificant effect or no effect on endogenous variable , this is because the F^2 values are less than 0.02 which is less than what Cohen(1988) described as small effect.Thus, table 10 confirmed no erogeneity in the models presented in the study. The significant effects of the independent variable on the dependent variable are not from outside the model and hence unexplained by the model.

Table 10: F-square statistics of full model

	LF	MF	PF	SP	firm age	firm size
LF				0.575		
MF				0.081		
PF				0.217		
SP						
firm age				0.013		
firm size				0.019		

Source: Field Data, Sekyiwa (2022

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Coefficients of Determination (in-sample predictive power)

The coefficient of determination R^2 measures the variance, which is explained in each of the endogenous constructs and is therefore a measure of the model's explanatory power (Hair et al., 2019). The R^2 is also referred to as in-sample predictive power (Sarstedt et al., 2021).

According to Ringle et al. (2020) and Hair et al. (2019), the R^2 ranges from 0 to 1, with higher values indicating a greater explanatory power. As a guideline, R^2 values of 0.75, 0.50 and 0.25 can be considered substantial, moderate and weak (Sarstedt et al., 2021).

Table 11: Coefficients of Determination (in-sample predictive power)

	R-square	**R-square adjusted**
SP	0.791	0.786

Source: Field Data, Sekyiwa (2022)

Hair et al. (2019) clarified that R^2 indicates the combined impact on the endogenous variable (SP) of the exogenous variables (supply chain flexibility). From table 11, the coefficient of determination (R^2) is 0.791 for the endogenous latent variable (SP). This means that supply chain flexibility substantially explains 79.1% of the variance in SP. Simply put, supply chain flexibility results in 79.1% change in sustainable performance. Hence, much attention should be given to supply chain flexibility.

PLS predict (out-sample predictive power)

Shmueli et al. (2019), developed PLSpredict as a holdout-sample-based procedure that generates case-level predictions on an item or a construct level to reap the benefits of predictive model assessment in PLS-SEM. Contrary to the standard structural model evaluation metrics such as the R^2 and Q^2, PLSpredict offers a means to assess a model's out-of-sample predictive

power i.e., a model's accuracy when predicting the outcome value of new cases (Hair et al., 2019).

To test for the out-sample predictive power, PLSpredict uses the partial least square root square mean error (PLS-SEM_RSME) against the linear model root square mean error (LM_ RSME) which is the benchmark (Shmueli et al., 2019).

Table 12: PLS predict (out-sample predictive power)

	Q²predict	PLS-SEM_RME	PLS-SEM_MAE	LM_RMSE	LM_MAE
ECP	0.684	0.567	0.408	0.626	0.45
ENP	0.647	0.598	0.457	0.66	0.45
SOP	0.717	0.537	0.397	0.594	0.42

Source: Field Data, Sekyiwa (2022)

When comparing the RMSE values with the LM values, the following guidelines apply (Shmueli et al., 2019); if the PLS-SEM analysis, compared to the naïve LM benchmark, yields higher prediction errors in terms of RMSE for all indicators, this indicates that the model lacks predictive power. If the majority of the dependent construct indicators in the PLS-SEM analysis produce higher prediction errors compared to the naïve LM benchmark, this indicates that the model has a low predictive power. If the minority (or the same number) of indicators in the PLS-SEM analysis yields higher prediction errors compared to the naïve LM benchmark, this indicates a medium predictive power. If none of the indicators in the PLS-SEM analysis has higher RMSE values compared to the naïve LM benchmark, the model has high predictive power

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From Table 12, all the PLS_RMSE of SP is less than its LM_RMSE. Hence the conclusion that the dependent variable indicators have lower PLS-SEM_RMSE compared to their LM_RMSE. Therefore, it can be said that the model has high predictive power. This means that the accuracy with which this model can predict the outcome of new cases for is high.

Table 13: Structural Equation for Higher Orde

	Beta	T-statistics (|O/STDEV|)	P-values	Decision Rule
LF->SP	0.49	6.549	0	Supported
MF -> SP	0.222	2.618	0.009	Supported
PF -> SP	0.299	3.705	0	Supported

Note: = P <0.05

Discussions of the main study findings

Objective one: Effect of product flexibility on sustainable performance

The study's first particular goal as depicted in figure 3 was to determine the effect of supply chain flexibility on the sustainability performance of packaged water manufacturing firms in Ghana's specifically Greater Accra region .This study however drew the following objectives ; The first objective of this study was to examine the effects of product flexibility on sustainable performance.

Table 13 depicts that product flexibility has a statistically significant positive effect on sustainable performance of packaged water manufacturing firms in Ghana (β=0.299, t=3.705, p=0.00). Hence β, is derived that a rise in product flexibility initiatives would result in 29.9% improvements in sustainable performance. This is because effective product flexibility incorporation with three pillars of sustainability will improve competitive

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advantage and superior performance over competitors. Also, this competitive advantage reduces the risk of packaged water manufacturing firms failing or striving to survive in an uncertain environment. Thus, when managers of packaged water manufacturing firms product water that meet the quality criterion of the Ghana standard authority and food and drugs authority, it makes consumers have trust in the product and hence remain loyal to such product.

The study's result has been supported by the resource-based view theory. The theory posits that in order to improve firms' sustainable performance and to achieve a competitive advantage over their competitors in the market, managers can improve product flexibility by producing product to meet customers' needs and also be environmentally friendly such as meeting quality criteria by adhering to GSA regulations, using green packaging and employee involvement as resources to reduce the adverse effect of their operations on the environment. This study analysis was supported by Mezher and El-Khali (2021), where they conducted a study to examine the relationship between supply chain flexibility, sustainability and their influence on operational performance.

The findings revealed a strong and positive relationship between product flexibility and sustainability. It was also aligned with Sandeepaa and Chand (2018), which explained that product flexibility is an innovative capability that if inculcated will help achieve performance without compromising quality. Again, Alamaro (2017) conducted a study to investigate product flexibility on operational performance, the study showed a positive relationship of product flexibility on operational performance.

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However Wang et al (2018) had a non-significant relationship on product flexibility and sustainable performance, on a study conducted in China.

Effect of modification flexibility on sustainable performance

The study's second objective states that modification flexibility has effect on sustainable performance of packaged water manufacturing firms in Ghana. This is because modification flexibility in adhering to the three pillars of sustainability improves competitive advantage over competitors. The second hypothesis of this study is to assess modification flexibility. In essence, modification flexibility has a positive effect on sustainable performance. The outcome of Table 13, showed that (β=0.222; t= 2.618; p-value= 0.009 <0.05). From the table β, it can be derived that a rise in modification flexibility dimensions would result in 26.18% increment in sustainable performance.

This means that modification flexibility (thus; alliterating product to meet sustainability dimensions) results in a significant improvement in sustainable performance. The study's result has been supported by the dynamic capability view theory. The theory posits that in order to improve their sustainable performance and achieve a competitive advantage over their competitors in the market; managers can make use of resources (human capability) to alliterating product to reduce the adverse effects of their operations on the environment. This study analysis was supported by Cheng (2021) where Cheng also assessed the linkages between big data analytic capabilities, circular economy practices, and sustainable supply chain flexibility on sustainable supply chain performance. The findings revealed a positive relationship between modification flexibility and sustainability. Again, this is practically seen as Voltic Company Limited alliterated their

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bottle to an environmentally friendly bottle (voltic twist) which is made up of 7% less plastic, making it easier for consumers to recycle. Also, this competitive advantage reduces the risk of packaged water manufacturing firms pressured to produce product that are not environmentally friendly. This findings align with Kyeremah (2019), which explained that modification flexibility is an innovative capability that if inculcated will enable firms to achieve sustainable performance. Again, Cheng (2021) supported the assertion with a study conducted

Effect of logistics flexibility on sustainable performance

The third hypothesis showing that logistics flexibility has influences sustainable performance of packaged water manufacturing firms in Ghana is strongly supported. This is because logistics flexibility in adhering to the three pillars of sustainability improves competitive advantage over competitors. This is practically seen as most packaged water have franchised companies to reduce transportation cost and carbon emission,also they use vehicles that do not expose the water to direct sunlight. Also this competitive advantage reduces the risk of firms failing or striving to survive in an uncertain environment.

The outcome of Table 13, showed that logistics flexibility has a positive and significant effect on sustainable performance (β=0.49; t= 6.549; p-value= 0.000 <0.05). From β, it can be derived that a rise in logistics flexibility dimension would result in 65.49% improvements in sustainable performance.

This means that logistics flexibility plays a significant role in ensuring sustainable performance in the packaged water manufacturing firms. The

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study's result has been supported by both the resource-based view theory and dynamic capability view theory. The theory posits that in order to improve their sustainable performance and achieve a competitive advantage over their competitors in the market, managers of packaged water manufacturing firms can improve logistics flexibility by purchasing raw materials that are environmentally friendly thus (inbound, outbound, demand management) to reduce the adverse effect of their operations on sustainability. This study analysis was supported by Fantazy, Mukerji, and Kumar (2012); in the survey it was stated that there is direct positive relationship between logistic flexibility and superior performance. It also aligns with Fantazy, Mukerji, and Kumar (2012), which explained that logistics flexibility is an innovative capability that if inculcated will enable firms to achieve sustainable performance

Chapter Summary

This section presents the study findings and discussion. Firstly, the response rate to the study questionnaire, followed by demographic characteristics of the participating respondents and descriptive analyses. Secondly, the researcher used PLS-SEM to test the quality of the data collected and preceded to analysing the hypotheses in accordance with the objectives for this study.

The analyses of data found out the following. Firstly, product flexibility has a positive and significant effect on sustainable performance. Secondly, modification flexibility has a positive and significant effect on sustainable performance. Thirdly, logistics flexibility has a positive and significance and sustainable performance.

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The findings of the study means that managers of packaged water manufacturing firms should take the implementation of various dimensions of supply chain flexibility seriously in their firms because when flexibility as innovative strategy is present, hand in hand with the three pillars of sustainability, sustainable performance can actually improve. The review, findings, and recommendations were discussed in the following section.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

In this final section, the summary and conclusions of the research were provided. In addition, the chapter offered to policy makers and managers of packaged water manufacturing firms, some recommendations based on the findings. The chapter finally made submissions for additional researches.

Summary of the Study

The study assessed supply chain flexibility on sustainable performance, where firm size and firm age were controlled to know its effect on the dependent variable. To achieve this overall objective, three specific objectives were formulated; the first objective was to examine the effect of product flexibility on sustainable performance. The second objective was to examine the effect of modification flexibility on sustainable performance. Lastly to examine the effect logistics flexibility on sustainable performance.

Upon addressing the above objectives, the study reviewed relevant theoretical and empirical literature. The theoretical literature was reviewed in the resource based view theory and dynamic capability view theory. The study also empirically measured the various dimensions of flexibility and sustainable performance. Again, the study designed the appropriate conceptual framework, which was pictorial, for further understanding, the connection between supply chain flexibility and sustainable performance

This study utilized the quantitative research method which used the positivist research philosophy and explanatory research design, the study measured supply chain flexibility on sustainable performance. The study

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employed packaged water manufacturing firms located in the Greater Accra Region. In all, populations of 120 employees were used for the study; self-administered questionnaire was used to acquire data from the employees. The data was decoded and analysed using the partial least squares structural equation model (PLS-SEM)

Key Findings

The findings of this study show that all the dimensions of flexibility have a significant influence on sustainable performance. As a result, sustainable performance indicators will increase to a greater extent the higher the level of flexibility implemented.

- The outcome from Table 13 showed that, product flexibility has a positive and significant effect on sustainable performance (H1: β=0.299; t= 3.705; p-value= 0.000 <0.05). The reason being that the t-stat (37.05) ,

- Also the study revealed from Table 13 revealed that, modification flexibility has a positive and significant effect on sustainable performance H2: β=0.222; t= 2.618; p-value= 0.009 <0.05). The reason being that the t-stat (2.22) for H^2 is greater than 1.96 and its p value (0.000) < 0.05.

- Again it was revealed that logistics flexibility has a positive and significant effect on sustainable performance (H3: β=0.49; t= 6.549; p-value= 0.000 <0.05). The reason being that the t-stat (6.549) for H^3 is greater than 1.96 and its p value (0.000) < 0.05

- However, the resourcefulness of the firms measured in terms of firm size (number of employees) and firm age (number of years in operation) failed to significantly influence the variation in the performance of packaged water manufacturing firms in Ghana.

Conclusions

The result presented in the study enhanced the understanding of supply chain flexibility and sustainable performance of packaged water manufacturing firms in Ghana, the study provided empirical evidence that concluded that:

Product flexibility has a favourable and considerable impact on sustainable performance of packaged water manufacturing firms. Based on the findings of the study, it can be concluded that if the management of packaged water manufacturing firms in Ghana wishes to improve the firm's sustainable performance; it should focus on building and maintaining product flexibility that takes into consideration the three pillars of sustainability as a company. The finding contradicts Huo, Gu and Wang (2018), where their findings stated that product flexibility has no significant effect on sustainable performance, but it is consistent with Mezher and El-Khali (2021) findings that there is a significant positive relationship between product flexibility and environmental performance.

According to the study's findings, modification flexibility has a positive and significant influence on sustainability performance. Based on the study's findings, it is possible to infer that when management in the packaged manufacturing firms in Ghana as desires to increase the firm's sustainable performance, it should focus on alliterate product to meet the three pillars of sustainability performance. The conclusion is Kyeremah (2019), who discovered that modification flexibility had a substantial positive link with company sustainability performance.

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The study found out that logistics flexibility significantly influences sustainable performance of packaged water manufacturing firms in Ghana. That is, firms inculcating sustainability in both their inbounds and out bounds of their operation would increase sustainable performance. Based on these results, it indicates that supply chain flexibility is a strategic tool in enhancing firm gains as well as sustainable performance if the three pillars of sustainability are inculcated. The study provides significant findings for the packaged water manufacturing firms and other shareholders. The study depicts that sustainable performance is dependent on supply chain flexibility; therefore it is necessary for the firms to note that to achieve and maintain higher performance, must inculcate product flexibility. For instance, customers are becoming sophisticated and hence need product that is environmentally friendly thus does not compromise on the three pillars of sustainability.

Implication for packaged water manufacturing firms in Ghana

Theoretically, this study enhances the theories used to underpin the study at a theoretical level. For example, the significant positive relationship between supply chain flexibility and sustainable performance of packaged water manufacturing firms resonates with the positions of dynamic capability based view theory and resource based view theory that posit that effective utilisation of firms' resource and capability will increase firms' superior performance. Thus, when managers of packaged water manufacturing firms act in line with the propositioned of the dynamic capability theory and resource based view theory, they will go a long way to enhance their performance. Also, the results supported the views of the dynamic capability theorist, re-echoing that when the

firms in the society act upon adding value to their resources, their performance improves overtime. Thus, appropriate use of resources in Ghana and the ability of packaged water manufacturing firms to operate effectively within their capabilities will promote their superior performance.

On practical level, the study's findings showed that by incorporating the three pillars of sustainability into supply chain flexibility, this strategic competency could surely help increase the outstanding performance of organizations. Thus, in order to fully benefit from the three pillars of sustainability and improve overall performance, the three pillars of sustainability and flexibility must be adopted at the same time due to increased market uncertainty, globalization and competitiveness.

Recommendations

Based on these results, the following recommendations were made; Firstly, this study provides an insight into the role of supply chain flexibility in enhancing sustainable performance. Thus increased competition, scarcity of resources, and market uncertainties will necessitate firms to implement supply chain flexibility. The three pillars of sustainability will improve the competitive stance of the organization, leading to improved performance. Sustainability and flexibility practices must be implemented simultaneously to exploit their benefits and improve performance. Managers of packaged water manufacturing firms can use the developed model to know which flexibility and sustainability practices optimize sustainable performance, thus this will help allocate the scarce resources. Also managers of packaged water manufacturing firms should refrain from implementing certain practices if they intend to improve a specific performance metric. Again, packaged water

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manufacturing firms should prioritize flexibility dimensions by their importance and plan when to implement each dimension so as the most important is taken into consideration. Secondly, managers of packaged water manufacturing firms can benefit from modification flexibility to improve upon their firms' sustainable performance. The success of modification flexibility and the ability of companies to improve their sustainable performance are rapidly becoming an essential requirement for competitive advantage and long-term growth. Managers have to be concentrated on identifying the various modification leads such as the novelty of the merchandise, the speed of launching and the use of technological innovation in existing products. Whereas, the implementation of logistics flexibility for the elimination of quality error in inbound and waste reduction and customer complaints. Thus, these initiatives create benefits such as increased in profit margin, market leadership, productivity, market share, effectiveness and efficiency of packaged water manufacturing firms.

Suggestions of Future Studies

This study suggests that future research extend the objectives built for this study to include the impact of potential moderator variables such as lean operations, innovation and transparency, and uncertainty. This would help gain more insight in supply chain flexibility and sustainable performance.

Again, future research can look at supply chain flexibility practices in the packaged water manufacturing industry and the relationship of these practices among firms in the industry. It's also relevant for future studies to concentrate on different industry like the food and beverage industry or the technology industry.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST
COLLEGE OF HUMANITIES AND LEGAL STUDIES
SCHOOL OF BUSINESS
DEPARTMENT OF MARKETING AND SUPPLY CHAIN
MANAGEMENT

Research Data Collection Instrument

Hello Respondent,

This questionnaire is designed to gather information on *Supply Chain Flexibility and Sustainable Performance*. This is purely for academic purposes and will be used as such. Therefore, your utmost privacy and confidentiality as a respondent is highly assured and respected.

Thank you for your participation

Rose Edu Sekyiwa
(SB/PST/20/0012)

SECTION A - Background Characteristics
This section takes data on your background characteristics. Select the most appropriate answer applicable to you
What is your gender?
- o Male
- o Female

Kindly indicate your highest level of education
- o Basic Certificate or Equivalent
- o Secondary or Equivalent
- o Tertiary or equivalent

Kindly indicate your role
- o Manager
- o Product /production manager
- o Quality assurance manager
- o Supervisor
- o Others please specify……

What is the size of the firm?
- o Small Scale Enterprise (6-30 employees)
- o Medium Scale Enterprise (31-100 employees)
- o Large scale enterprise (over 100 employees)
How old is the firm?

- o   Less than 6 years
- o   6 to 10 years
- o   Over 10 years

SECTION B – supply chain flexibility dimensions
This section gathers data on various dimensions of supply chain flexibility. For each of these four dimensions, the responde nts will be asked to rate the strategic importance of the item using a five-point Likert scale with endpoints. Kindly use the five-point Likert scale to indicate your level of agreement with the statements in each area.
The scale is 1-Disagree, 2-Least Agree, 3-Fairly Agree, 4-Much Agree, and 5-Strongly Agree. Tick [√] as applicable.

Product Flexibility					
o Statements					
We are able to cope with fundamental changes in the market.					
We are able to produce product in varieties to meet consumer needs.					
We are able to produce to consumers need or capacity.					
We reallocate capacity between products in response to realized demand.					
We are able to accommodate market pressure.					
We can customise product to meet consumer preference.					
Modification flexibility					
o Statements					
We can quickly modify our product in response to customer requests.					
We can easily take the lead in the alteration of product.					
We can introduce new products easily and at a low cost					
We make product modifications effectively due to process correction or customer changing needs.					
Logistics flexibility					
o Statements					
We can quickly respond to multiple customers' delivery time requirements.					
We deliver product timely and efficiently					
We adjust to inventories on a regular basis/ we acquire raw materials and supplies quickly and effectively.					
We have good relationship with our key suppliers.					
We have good relationship with our customers.					
Our transport vehicles do not expose product to the sun.					

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Section C (Sustainable Performance)
This section looks at sustainable performance in the context of supply chain flexibility. Kindly, use the five-point Likert scale provided to indicate your level of agreement with the statements in each area
The scale is 1-Disagree, 2-Least Agree, 3-Fairly Agree, 4-Much Agree, and 5-Strongly Agree. Tick [√] as applicable.

Economic performance					
o	**Statements**				
	Our company works towards improving its market share.				
	Our company generates and sustains profit.				
	Our company have increase on sales.				
	We produce quality product at a low cost.				
Environmental performance					
o	**Statements**				
	We decrease the consumption of hazardous / harmful/ toxic materials				
	We decrease the frequency of environmental accidents and crises.				
	We ensure the use of environmental friendly transportation.				
	We encourage recycling of waste.				
Social performance					
o	**Statement**				
	We improve the overall stakeholder welfare or betterment				
	We improve community health and safety				
	We reduce environmental impacts and risk to the general public				
	We improve occupational health and safety of employees				

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APPENDIX B

ETHICAL CLEARANCE

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878309
E-MAIL: irb@ucc.edu.gh
OUR REF: UCC/IRB/A/2016/1584
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096

27TH SEPTEMBER, 2022

Ms. Rose Edu Sekyiwa
Department of Marketing and Supply Chain Management
University of Cape Coast

Dear Ms. Sekyiwa,

ETHICAL CLEARANCE – ID (UCCIRB/CHLS/2022/52)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research **Supply Chain Flexibility and Sustainable Performance in Packaged Water Processing Firms in Ghana.** This approval is valid from 27th September, 2022 to 26th September, 2023. You may apply for a renewal subject to submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD

UCCIRB Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST

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