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THE EFFECT OF SUPPLY CHAIN SUSTAINABILITY ORIENTATION ON OPERATIONS AT THE TEMA PORT. THE MODERATING ROLE OF INFORMATION SHARING.

By

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgement has been made in the text.

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DEDICATION

I officially dedicate this work to my family especially my husband, Mr. Lah Obeng Francis for his full support and assistance in my endeavor for this success, also my mother Glady Korko Awatey for her support, and encouragement and financially to my children Samuel Nyameye Lah-Obeng and Immuenal Adom-Lh Obeng.

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ABSTRACT

Stakeholder pressures drive companies to prioritize environmental and social responsibility, aligning with the increasing emphasis on sustainable operations globally, especially in supply chains. The study at Tema Port explores the impact of supply chain sustainability orientation on operations, considering the moderating role of information sharing. Employing the knowledge-based view theory and an explanatory research design, the questionnaire-based study establishes positive and significant relationships between sustainability orientation and operations, as well as sustainability and information sharing. Information sharing is identified as a significant moderator between sustainability orientation and operations. Recommendations include integrating sustainability into supply chain management for long-term benefits, emphasizing sustainability in organizational culture, and collaborating with stakeholders for effective sustainability implementation. Improved communication, information exchange, and enhanced supply chain transparency are crucial for minimizing early implementation costs and reaping long-term advantages. The study highlights the necessity of a collaborative approach, involving stakeholders in sustainable supply chain practices to achieve economic, social, and environmental dimensions in the triple bottom line.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

In recent years, customers, employees, investors, and governments have put increasing pressure on companies to demonstrate greater environmental stewardship and social responsibility. This comes at a time when the organization's case for sustainable operations grows stronger every year. According to Shukla et al. (2019), in today's growing economy, overconsumption, and overproduction have increased environmental deterioration worldwide. Organizations' unsustainable practices, patterns, and producers through production based on traditional resources-depleting practices have contributed significantly to the socio-environmental problems. Consumers and producers are linked by supply chains and sustainability became seen as a way to reverse socio-environmental degradation.

Traditionally, supply chain management focuses on profit enhancement and close leaders. However, more recently, the increasing rate of environmental degradation and resource depletion caused by economic and social development and growth have shifted organizations' focus to socio-environmental issues. Also, Tseng and Hung (2019), mentioned that with the emergence of globalization, most organizations want to achieve excellence in terms of efficiency in their logistics operations, in particular when customer satisfaction is directly affected. Christopher, (2018), stated that currently, customers are demanding not only product and service quality but also a fast, flexible and consistent delivery service. With such a complex supply chain, it is important to assure that conscious decision is made at the design and planning level to promote sustainability. Ocampo and Prada (2019), suggested that the adoption of

sustainability for the solution of problems in the supply chain is very important to organizations.

In addition, Seman et al., (2019), mentioned that economic growth increases the level of energy and material consumption which contributes to environmental issues and resource depletion problems. It has become significant for organizations facing competitive, regulatory, and community pressures to balance economic, social, and environmental performance. Most organizations are starting to promote sustainability. According to Liu et al., (2018), sustainability is related to the reduction of the environmental impact caused by economic activities which led to the creation of the concept of green supply chain management.

Zhu et al., (2019), stated that supply chain sustainability orientation emerges as a new systematic environmental approach in supply chain management and has been increasingly accepted and practiced. The current changing in environmental requirements that influenced manufacturing activities have increased attention to developing environmental management strategies for the supply chain. Therefore, it is important to integrate environmental management practices into the whole supply chain management in order to achieve a sustainable supply chain as well as maintain effective operations in the organization. According to Dan and Liu (2017), supply chain sustainability integrates economic performance, environmental performance, and resource efficiency into the entire functions of supply chain activities involving raw materials and component purchasing manufacturing packages, distribution, retailing, and the subsequent recycling of the products. Thus, supply chain sustainability is a comprehensive strategic alliance that includes the following partners: suppliers, manufacturers, distributors, retailers, consumers, and government. Due to the stakeholder involved in the supply chain, there is a need to orient all the key stakeholders involved in the process. The orientation aspect of supply chain sustainability ensures all the

key players involved in the supply chain play their roles effectively to achieve environmental, social, and economical protections.

According to Slack et al., (2019), the operation is a vital part of an organization to achieve success because it includes the activity of managing the resources to produce and transfer products and services. The operations function is part of the supply chain management that ensures that all activities are managed effectively, cohesive, and working to enhance an organization's overall efficiency. One way in which companies can gain a competitive edge is by deploying the basic functions of operations management in a more sustainable manner that can promote environmental and social protection.

The performance of supply chain sustainability orientation and operations have essentially depended on their level of coordination. Previously, key stakeholders in the supply chain process have ordered based on the size of the demand from their downstream firms in order to minimize the impact of the bullwhip effect. The current use of information sharing ensures that partners involved in the supply chain are able to mitigate the impact of demand variability. This exchange of information not only boosts supply chain performance but also reduces the waste of resources. According to Khan et al., (2016), the relationship with suppliers includes the concern for social and environmental issues and the exchange of information related to operations and policies related to materials flow.

The impact of information sharing on supply chain sustainability has been an important issue in the literature. Lee et al., (2019); Roman (2016), and Hussan et al., (2017), revealed that influence sharing has an influence on supply chain sustainability by reducing the cost and waste of materials as well as promoting information flow and material flow in the organization. Lee el at. (2017), mentioned that information share has great value for supply chain sustainability.

This study examines the effect of supply chain sustainability orientation on operations at the Tema Port. The moderating role of information sharing.

1.2 Statement of the Problems

The supply chain nowadays is taking relevance in organizations due to globalization, production and operations do not depend on a single geographical point, but organizations need to improve their efficiency and seek to have the best relations with their suppliers, and customers in order to ensure a flow of goods to the financial consumer. Research indicates that organizations are moving toward supply chain sustainability and how they are managed, however, they are focusing on just one factor, economic, neglecting the environmental and social factors that lead to the organization. Thus, organizations only focus on the economic aspect of sustainability orientation and ignore environmental and social factors that ensure complete sustainability of the supply chain.

Jung (2019), mentioned that the business environment is an ear where sustainability has become a fundamental part of the organization. Thus, supply chain sustainability has been integrated into the strategic planning of most organizations. Supply chain sustainability is considered one of the main efforts aiming to integrate environmental, social, and economic parameters within the supply chain management system. However, the most organization lacks an understanding of the need to integrate sustainability into the supply chain function. Management, employees, and employers lack an understanding of the long-term benefit of supply chain sustainability.

Transforming the development of the supply chain towards sustainability is tied to a lot of factors that serve as barriers to implementation in the organization. Among the barriers to integrating sustainability into the supply chain can be related to business logic, complexity, socio-political interest, and paradoxical conflicts. According to Nilsson (2018), business logic

is among the challenges involved in integrating the supply chain with sustainability. Implementation of sustainability implies that management has to sacrifice short-term financial sustainability for long-term financial sustainability. For most organizations, it is a challenge for them to forgo long-term performance and develop new business modes where all corporate social responsibility principles of sustainable development become as important as monetary profitability (Lother, 2018).

According to Abbasi (2019), the increasing complexity of supply chains in their evolution makes it very difficult for organizations to add sustainability aspects. Thus, the concept of the supply chain is very broad for organizations to handle and manage effectively. Therefore, the inclusion of sustainability in the supply chain borders the scope for small and some larger organizations to handle all. Among the factors that increase the complexity of the supply chain can be related to increasing transportation and distribution of goods, increasing consumption and demand for goods and services due to population growth and purchasing power of middle cases consumers, an increasing number of products and bill of materials due to market diversification and economies of scope, increasing offshore relationship, a larger distance between production and consumptions, movement of production to far-reaching countries as well as internationalism of labour forces due to globalization and increasing business dynamics due to free trade and the shorter business cycles of products.

Information sharing is the foundation of supply chain integration, the decision on the level of adopting sustainability is a strong correlation with decisions on what information should be shared and how it should be shared. According to Cooper et al. (2018), designing the configuration of information sharing is not merely determining with whom companies should integrate but also designing with whom a company and partners' activities are linked. Also, Motwani et al. (2018), mentioned financial barriers. Financial constraints are a key barrier to

information sharing in the supply chain. Cost considerations are the prime challenges to supporting the infrastructure and manpower requirements of information systems.

In addition, Clark and Hammond (2019), stated the implementation of a transparent information-sharing system has become very expensive in the supply chain with members in the organization. Some of the members are unwilling to invest in sophisticated information-sharing tools for the purpose of ordering and business processes.

There exists a gap in the research work done. Most studies focus on the effect of supply chain sustainability on organizational performance (Kamble et al., 2022: Sagnak et. al., 2018; Xie et al., 2019). However, this study addresses the gap by examining the relationship between supply chain sustainability on operations. The moderating role of information sharing.

1.3 Research Objectives

The main objective of the study is to examine the effect of supply chain sustainability orientation on operations at the Tema port. The moderating role of information sharing. The specific objectives are;

1. To examine the effect of supply chain sustainability orientation on the operation.
2. To determine the effect of supply chain sustainability on information sharing.
3. To examine the moderating role of information sharing on the relationship between supply chain sustainability and orientation operations.

1.4 Research questions

1. What is the effect of supply chain sustainability orientation on operation?
2. What is the effect of supply chain sustainability on information sharing?

3. What is the moderating impact of information sharing on the connection between supply chain sustainability and operational orientation?

1.5 Significance of the study

The study examines the effect of supply chain sustainability orientation on operation at the Tema Port. The moderating role of information sharing. This study will be beneficial to the following stakeholders: supply chain officers, management, and employees in the supply chain department.

To supply chain officers, this study would enable them to identify the effect of supply chain sustainability orientation. Also, the study would highlight to supply chain officers the effect of supply chain sustainability on information sharing. Also, to supply chain officers the study would improve the knowledge of current definitions of supply chain management, supply chain sustainability, information sharing, and operations.

Also, management, this study would influence them to take adequate measures to promote supply chain sustainability. Through this study, management could identify employees' and managers' levels of understanding of supply chain sustainability, information sharing, and operations. Therefore, the study would enable management to promote supply chain s sustainability orientation through awareness creation.

To employees, the study would improve their knowledge about supply chain sustainability orientation. Also, the study would enable employees to identify the benefit of practicing sustainability among the supply chain functions in the organization. Also, the study would enable employees to play their roles in achieving supply chain sustainability. To researchers, authors, academicians and students, this study would serve as a source of reference for them.

1.6 Summary of methodology

The research methodology presents the various methods and procedures employed to achieve the research objectives and answer the research questions. The research methodology examines the research design, population, sampling size, sampling techniques, and others. This study adopts an explanatory research design. The use of this explanatory research design enabled the researcher to examine the relationship between the variables involved in this study. The variables involved in the study can be related to supply chain sustainability, operation, and information sharing. In addition, the study employed deductive. This enables the researcher to formulate hypotheses and test the hypothesis to either confirm or reject the hypothesis. Also, it enables the researcher to employ a quantitative research approach to measure the response of the respondents using standard deviation, mean, frequency, and percentage. The population for the study includes working staff in the procurement department of Tema Port. A population of 200 respondents was considered for this study. Simple random techniques would be employed for this study. The questionnaire is the main data collection instrument for this study. Also, the SPSS version 23 would be employed for this study.

1.7 Scope of the study

The study examines the effect of supply chain sustainability orientation on operations at the Tema Port. The moderating role of information sharing. The unit of analysis includes the working staff of Tema Port. This indicates that geographically the study is limited to Accra. The coverage is only in Accra but the selected organization has fewer branches in Ghana. This research centers on the intricate dynamics of supply chain sustainability orientation and its ramifications on operations within Tema Port. Emphasizing the specific context of Tema Harbour, the study aims to unravel how sustainable practices impact operational efficiency. Additionally, it delves into the moderating role of information sharing, assessing how collaborative data exchange enhances or mitigates the relationship between sustainability

initiatives and operational outcomes. The investigation strives to provide nuanced insights into the interplay of sustainability, operations, and information sharing, offering valuable implications for optimizing supply chain practices and fostering sustainable development at Tema Port.

1.8 Limitations of the study

The limitations of the study include factors that serve as a hindrance to the study. This study is limited by its quantitative approach to examining the supply chain sustainability orientation, operation, and information sharing. The use of a qualitative approach could have provided further explanation of the response of the respondents. Also, the use of a closed-ended questionnaire limits the responses to select only from the alternative provided to them. Therefore, the respondents were limited to only selecting from the alternative if they have any suggestions to be made.

1.9 Organization of the thesis

This thesis is divided into five chapters. Chapter one presents the background of the study, problem statement, research objectives, research questions, the significance of the study, research methodology, scope of the study, limitations of the study as well as the organization of the study. Chapter two presents the literature review. The literature review presents the conceptual review of supply chain sustainability orientation, the concept of operation as well as the concept of information sharing. Also, the conceptual review, theoretical review, and empirical review was presented in chapter two. Chapter three is a review of the research methodology. The research methodology presents the various techniques involved in achieving the research objectives. The research methodology presents the research design, population, sampling size and sampling techniques, source of data, data collection instrument, data analysis, and ethical consideration as well as the profile of the study organization. Chapter four

presents the data presentation, analysis, and discussion of the findings. Chapter five presents the summary of findings, conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The second chapter of the study presents the literature review. The literature review is a summary and review of the research studies done on a particular topic. This literature review will focus on examining the effect of supply chain sustainability orientation on operations. The moderating role of information sharing. The literature review will present the conceptual review, theoretical review, empirical review, and conceptual framework.

2.2 Conceptual Review

A conceptual review is an evaluative analysis that synthesizes existing theoretical frameworks and concepts relevant to a research topic, providing a foundation for conceptual clarity and guiding empirical investigations (Johnson, 2010). It critically examines and organizes theoretical perspectives, facilitating a comprehensive understanding of the subject matter (Smith et al., 2018).

2.2.1 Supply Chain

The concept of supply chain management has developed over a period of 100 years from a labor-intensive process to the current management of logistic management. According to Okafor et al., (2018), the concept of supply chain management originated from the supply schemes of Toyota motors in which the concept was considered a means of managing suppliers. During that period, the main goal of supply chain management can be related to decreasing inventory was much possible significantly and regulating suppliers' interaction. Supply chain management received due responsiveness in early 1980, however, to this date, supply chain management has not been theoretically understood due to its complexity and various authors having different perceptions of the concept (Walker et al., 2019).

A supply chain is defined as the network of organizations that are involved, through upstream and downstream linkages in the different processes and activities that produced value in the form of products and services in the hand of the ultimate consumer. According to Christopher (2019), the supply chain includes all activities that transform raw materials into financial products and deliver them to customers. Anderson (2019), defined the supply chain as a network of individuals and companies who are involved in creating products and delivering them to the consumer. Also, the supply chain includes every step that is involved in getting a finished product or service to the customer. Chopra and Meindl (2017), mentioned that the supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. Within the organization, the supply chain functions involved receiving and filling a customer request, developing a new product, marketing, operations, distribution, finance, and customer service.

Lambert and Cooper (2018), defined supply chain management as the combination of the main procedures from the consumer all the way to the initial suppliers that deliver the products, services, and information to increase value to clients as well as stakeholders. Dibb et al., (2019), defined supply chain management as a long-term partnership among marketing channels that have the objective of reducing inefficiencies, cost, waste, and redundancies in the marketing channels and also developing innovative approaches and ways of satisfying targeted customers.

Supply chain management is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage (Thomas and Grittin, 2018). This implies that supply chain management represents a conscious effort by the management to develop and run the supply chain in the most effective and efficient ways possible in the organization.

According to Ritzman et al., (2019), supply chain management consists of developing a strategy to organize, and control motivates the resources involved in the flow and services and materials within the supply chain. Simchi-Levi et al., (2018), defined a supply chain as a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores so that merchandise is produced and distributed in the right quantity to the right location and at the right time in order to minimize system-wide costs while satisfying service level requirements in the organization. Also, Wisner et al., (2019), defined supply chain management as the integration of trading partners' key business processes from initial raw materials extraction to the final or end customer including all intermediate processing, transportation, and storage activities and the final scale of the end product customers.

2.2.1 Supply Chain Sustainability Orientation

The sustainability concept has been introduced in many fields including management, technology, and supply chain. Currently, organizations have established various environmental strategies to improve their environmental and business operations. Supply chain sustainability is an important strategy that supports organizations in improving their overall performance of the organization (Reefke et al., 2018). Research indicates that environmental issues have had a great influence on industrial management systems and styles. Since the late 1920s, a managerial paradigm, sustainability management has helped to guide companies to cope with environmental issues. The environment around the world needs to be protected to promote economic and social development for the benefit of a different generations. This is among the reasons why sustainable development has gained worldwide attention in recent years and its impact is still growing.

According to Tomsana et al. (2019), the expansion of sustainable development aids in resolving the basic problems facing humanity today and, in the future, as well as encouraging people's

long-term pleasure and well-being. For contemporary development and supply chain marketing within the company, the phrase "sustainable development" has gained a lot of traction (Hopwood et al., 2018). Additionally, management is being pushed to compete on sustainability on a worldwide level by sustainability, which has emerged as an essential organizational goal. The ability to maintain standardized procedures without harming the environment is sustainability in supply chain management. This suggests that supply chain sustainability seeks to lessen the effects of elements that have an impact on the business environment, such as global warming, ozone depletion, and deforestation.

The term "supply chain sustainability" refers to a collection of procedures intended to influence, manage, and support environmental performance by redefining organizational roles and processes and allocating potential human and material resources (Qinghua and Joseph, 2017). Sustainability in the supply chain enables businesses to reduce waste and pollution generation while also assisting them in creating a culture that values the environment. Furthermore, a sustainable supply chain is one that successfully incorporates morality and environmental responsibility into a competitive business model (Carter, 2018). Additionally, supply chain sustainability refers to a company's employment of ethical business practices at every stage to safeguard both the organization's production procedures as well as the people and environments throughout the entire chain. According to this concept, businesses must follow environmental and social norms in both their own operations and those of their suppliers.

Firm orientation is a crucial component in the implementation of sustainability in the supply chain, according to Roselene et al. (2018). The company is aware that plans must be developed for implementation and sustainability. The strategic recognition by a company of the systemic, strategic implications of all the activities involved in managing the product, information, and financial flows from raw material suppliers to the retailer of finished goods to the consumer

and to the end of life is known as supply chain sustainability orientation. Additionally, Godfrey (2018) defined supply chain sustainability orientation as a technique to enhance the supply chain's environmental performance.

According to Carter (2018), supply chain sustainability orientation refers to the cooperation between purchasing departments to improve the supply chain's environmental friendliness through measures like recycling and the use of non-hazardous goods. According to Tseng et al. (2019), operational activities carried out by firms with the intention of minimizing environmental effects and promoting sustainability are included in supply chain sustainability-oriented practices.

2.2.3 Operations Management

Operation is the area of an organization that deals with turning a variety of inputs into the needed outputs (services) with the necessary level of quality. Management is the process by which various resources used in the operations subsystem of the company are combined and transformed into value-added services in a regulated way in accordance with organizational policies. Production management refers to the collection of linked management tasks involved in creating a certain product. The comparable collection of management activities is known as operations management if the same notion is applied to services management.

Whether or not it is referred to as "operations," every corporation has an operations function. A lot of organizations have the production of goods and/or services as their objective or purpose. To accomplish this, they must obtain resources, transform them into outputs, and then disseminate them to the target audience. Operations refers to all the tasks necessary to produce and provide an organization's clients or customers with its goods or services.

An operation is described in terms of the organization's mission, the technology it uses, and the administrative and human processes it entails. Manufacturing operations and service operations

are two categories for operations inside an organization. A conversion process that involves service produces an intangible output, such as a deed, performance, or effort, whereas a conversion process that includes manufacture produces a tangible output, a product.

Designing, managing, and enhancing the systems that produce the organization's products or services is what operation is. Most businesses devote the majority of their financial and human resources to tasks related to producing goods or providing services. Therefore, operation is essential to the success of an organization. Operations is typically a key functional area in large, complex organizations, with individuals assigned particularly to manage all or a portion of the organization's operational processes. It is a critical functional area since it has a significant impact on how well a business is able to satisfy its clients. As a result, all managers should have a basic understanding of operations management principles since they offer a methodical approach to examining an organization's processes.

The management of processes that turn inputs into goods and services that provide value for the client is known as operations. The objective of operations management is to produce goods and services that successfully meet customer needs while maximizing efficiency. Three primary sorts of decisions are involved in production and operations management, and they are often made at three separate stages: planning a production. Operations managers must make their first decisions while planning. Managers make decisions about the where, when, and how of production at this point. They acquire the required resources and secure site locations. The decision-making process for production control at this point is concentrated on quality and cost control, scheduling, and the actual day-to-day operations of running a factory or service facility.

.2.2.4 Information Sharing

It is possible to define information sharing as "a set of activities by which information is provided to others, either proactively or upon request, such that the information has an impact

on another person's (or persons') image of the world... and creates a shared, or mutually compatible working, understanding of the world" (Sonnenwald, 2016). With this definition, the act of sharing information has two main components: providing information to others and receiving information that has been offered by the information provider. Sharing of knowledge involves similar mechanisms.

Information sharing refers to the dissemination of pertinent information to organizations, individuals, or systems. Organizations should respond to four key questions in order to improve the outcomes of information sharing: The questions of what to share, with whom to share it, how to share it, and when to share are asked first. The effectiveness of responses will lessen duplication, lower sharing expenses, and enhance responses (Larson et al., 2019). Knowledge sharing and information integration are other names for the concept known as "Information Sharing." A supply chain contains a wide range of information, including logistical, business, strategic, and tactical data, among others (Stock et al., 2018). With recent advancements in information technology, the effect of information exchange on supply chains has grown more significant (Hussan et al., 2017). Additionally, certain studies have been carried out to concentrate on the effect of information sharing on product quality. However, further research is needed to define precisely how and what information should be disseminated, as well as its positive impacts on quality improvement (Zhao et al., 2019).

For supply chain integration and transparency among chain members, information sharing is regarded as a critical activity. According to Ali et al. (2017), this would give managers the chance to effectively plan their strategies and be able to respond correctly to reliable information. It is described as the procedure that permits data gathering, documenting, and storing, retrieving and sharing of private information by (Simatupang & Sridharan, 2001). Participating members are only permitted to share information if they are willing to do so; as a

result, they should restructure their information architecture in order to be able to collect and transfer all private information in order to improve their decision-making abilities.

Sharing information throughout a supply chain offers many advantages for all parties involved. It reduces many forms of demand, product, and technology-related uncertainties that increase the cost of supply chain operations (Lee et al., 2017). Sharing information enables supply chains to operate more effectively and efficiently since it has a number of benefits. Better coordination between various departments and supply chain participants, as well as improved control of the supply chain processes, are just a few benefits mentioned by (Khurana et al., 2011). These benefits may also result in a shorter lead time for production, more stable outputs, and reliable quality. Information sharing is cited by (Khurana et al., 2011) as a crucial element for any effective SCM system as they emphasized the requirement to create an effective information sharing framework. At the industry and enterprise levels, it has been determined to be essential for successful innovation and development of supply chain management.

2.3 Theoretical Review

2.3.1 Knowledge-Based View Theory

This study employed the knowledge-based view theory. According to the firm's knowledge-based theory, knowledge is its most important strategic asset. According to its proponents, the varied knowledge bases and competencies among organizations are the key determinants of sustained competitive advantage and superior corporate performance because knowledge-based resources are frequently challenging to replicate and socially complicated. The corporate culture and identity, rules, practices, documents, systems, and personnel are just a few of the many things that carry this information and have them embedded in them. This perspective, which has its roots in the literature on strategic management, expands and builds upon the

Penrose (1959)-first advocated a resource-based view of the company (RBV) (Wernerfelt 1984, Barney 1991, Conner 1991).

2.3.2 Resource-Based Theory

Although the resource-based viewpoint of the firm acknowledges the significant role that knowledge plays in businesses that attain a competitive advantage, supporters of the knowledge-based perspective contend that it does not go far enough. In particular, the RBV views knowledge as a general resource rather than one with unique properties. As a result, it does not differentiate between various knowledge-based capacities. Large-scale intra- and inter-firm knowledge management can be accelerated and improved with the help of information technologies (Alavi and Leidner 2001).

An organizational learning management approach called a knowledge-based view of the firm (KBV) gives businesses solutions for establishing sustainable supply chain orientation. This is accomplished through involving more employees in the creation and management of the company's sustainable orientation and long-term transformative ambitions. Continuous knowledge acquisition and transmission are required inside corporate organizations due to a variety of variables, including rapidly evolving market competition brought on by globalization, periodic deregulation, and the need for the firm to attain supply chain sustainability.

According to Zeleny (2015), knowledge includes both collaborative learning and human input. Depending on the organizational context or area under that, knowledge can have varied scopes, such as technical knowledge, customer-related knowledge, product-related knowledge, or managerial information (Akroush, 2017). Knowledge management in businesses is particularly crucial. Thus, the process of supporting knowledge-related activities, such as the development, capture, transformation, and use of knowledge, is known as knowledge management. It has

been stated that the knowledge management strategy can help develop organizational strengths like innovation, which are essential for creating a sustainable supply chain.

An important method for sharing information that serves as the foundation for building human capital involved in the structural and regular operations of the company is the knowledge-based view. The knowledge-based view suggests that in order to improve operations and supply chain sustainability, heterogeneous knowledge structures must be established throughout a firm's management hierarchies. This is due to the fact that knowledge-based resources are constantly characterized by transmission, imitation, and social complexity challenges. To achieve supply chain sustainability, management should figure out how to strike a balance between using experts' knowledge and their preferences. As it enables people to update, remodel, or adjust their belief systems in relation to others and is helpful in expanding the richness of the supply chain sustainability orientation, the process of various interpretations of knowledge is crucial.

2.4 Empirical Review

2.4.1 Dimensions of supply chain sustainability orientation

The survival of companies, both now and in the future, depends on effective and efficient supply chain management (Votano et al., 2019) Ballou (2018) asserts that since supply chain management has become more significant over time, numerous planning models have been put into place to incorporate a sustainable approach. According to research, supply chain management embraced environmental awareness at the end of the 20th century (Rosen et al., 2019). Governments began establishing regulations to protect the environment from corporate operations as a result of concerns on a national and international level. By implementing creative concepts both within their own companies and with their supply chain partners, businesses have begun to make their supply chains sustainable (Zhu et al., 2018). Sustainability in supply chains requires three-dimension which include social, environmental, and financial.

2.4.2 Social dimension

Developing and upholding corporate policies that are fair to employees, communities, supplier partners, and supply chain employees are necessary to improve sustainability with regard to the social component, according to Sloan (2019). Suppliers, manufacturers, customers, and society are included in the social component associated to stakeholders. According to Bai and Sarkis (2019), addressing social issues in supply chain management can aid in achieving upstream social sustainability. Additionally, downstream, socially conscious purchasing can aid in the organization's sustainability and efficiency. Adopting fair-trade values and strong governance practices within the organization are two ways to support social sustainability.

According to Najjar et al. (2018), the social component of sustainability guarantees that businesses and their partners along the supply chain manage their operations in a way that supports employee well-being, workplace morale, and compliance with human rights laws. Additionally, manufacturers must be concerned that their suppliers do not support the indiscriminate hiring of children across their operations, refrain from using chemicals, do not endanger the health and safety of employees, and are willing to facilitate and support the sustainability practices of both suppliers and customers at the operational level. These concerns are all important aspects of promoting social sustainability in supply chain management.

2.4.3 Environmental dimension

Supply chains frequently comprise a sizable portion of the environment of a firm. Since the majority of businesses have grown into emerging and developing nations' economies. As a result of expansion, their supply chain is probably going to become more complex, international, and scattered, which will have a bigger influence on the environment. Customers are getting more environmentally aware, and excellent environmental practices are becoming

a crucial element when choosing a supplier. Organizations are becoming more aware of the possible environmental impact of the goods and services they are provided with.

Environmental sustainability has gained more importance in supply chain management during the last few decades. The increasing rate of environmental deterioration in recent years has forced stakeholders to implement eco-friendly methods in order to secure long-term benefits. Environmental sustainability has gained importance in supply chain management during the last few decades (Wilard et al., 2019). The rapid worsening of the environment in recent years has forced the stakeholders to implement eco-friendly methods in order to secure the long-term advantage.

2.4.4 Economic dimension

The Solow (1974, 1986, 1993) expanded theory on capital convertibility and the Hicks-Lindahl concept of maximum income form the foundation of the economic sustainability component. These concepts can be attained by preserving essential wealth (capital) resources for the benefit of future generations and putting the fair distribution of resources among generations into practice. (2018) Ciegis et al. According to this definition, economic sustainability is maximizing the flow of revenue and consumer spending into corporate operations. One of the fundamental concepts of ISO 26000, which also addresses concerns of ethics and governance, is accountability.

Issues with accountability should be taken into consideration as economic ones, particularly as sustainable development gains ground. Some businesses disclose profit margin, also known as earnings before interest, taxes, depreciation, and amortization, by extensive examination of numerous CSR reports (EBITDA). However, EBITDA only roughly represents the cash flow available to pay down financial debt (Mokhtar et al., 2018).

There are additional costs associated with economic sustainability that must be taken into account for thorough sustainable development. This fosters the discussion of other cost-related issues, such as the price of energy and raw materials. The sales, operation income, and net income are all significantly impacted by these costs. This eventually encourages businesses to reduce those costs in order to maximize profit. Manufacturing is the industry's foundation for rapid growth, and this circumstance is locally resolved through R&D. The majority of research and development is done in this industry, and many high-end services are dependent on its manufacturing (Aiginger et al., 2018). Companies have always viewed research and development as a way to increase product sales. Because of this, investing in research and development is the best method to guarantee that innovation never stops.

2.4.5 Type of information sharing in the organization

Within a supply chain, a variety of information, including logistical, business, tactical, and strategic information, can be communicated. There are several well-known categories of information, including: 1) inventory information, 2) sales data, 3) sales forecasting, 4) order information, 5) product capability information, 6) exploitation information of new products, and 7) other information. Inventory information is the most popular to share between partners. By sharing this, we can prevent stock duplication and runout (Weber et al., 2019). Additionally, it lowers the overall stock level and stock cost, allowing for more precise forecasting and decision-making. Sales data sharing can reduce loss brought on by shortage or overproduction of innovative items, avoid order blow-ups, and accurately reflect consumer demand (Anuar et al., 2019).

Independent projections are made by each party in a supply chain. Better projections are made by sharing sales estimates, which could increase the supply chain's competitive advantages. By quickly identifying the bottleneck in a supply chain, sharing order information would improve

the standard of client services. The dissemination of knowledge about product capabilities might help slow down the anticipated decline in gaming activity and prevent potential triggers for the bullwhip effect (Seman et al., 2019). When manufacturers learn about the true demand from retailers, they can receive a timely supply of items from suppliers if information about new products is provided. There are other forms of information as well, including quality information, progress updates on freightage techniques, supply chain function parameters, plans, etc (Weber et al., 2019).

2.5 Conceptual Framework

This section of the study presents the conceptual framework. The conceptual framework presents the relationship between the variables involved in the study. The variables involved in the study include information sharing, supply chain sustainability orientation, and operation. Therefore, the conceptual framework will present the relationship between supply chain sustainability orientation and information sharing, the moderating role of information sharing on supply chain sustainability orientation operation as well as the relationship between supply chain sustainability orientation on the operation. Figure 2.1 presents the conceptual review.

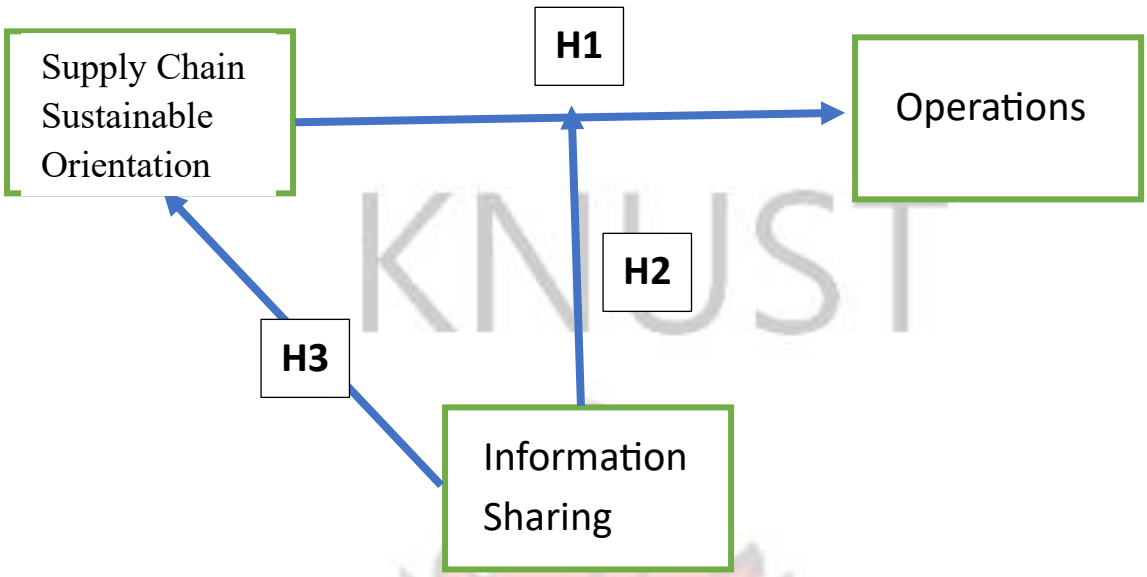

Figure 2.1 Conceptual framework

Source: Author's Construct (2023)

2.5.1 SC Sustainability Orientation and Operations

The formulation of H1 centers on investigating the impact of Supply Chain Sustainability Orientation (SCSO) on operations at the Tema Port. This hypothesis is grounded in the existing academic literature, which provides insights into the relationship between sustainability practices and operational outcomes.

According to Sarkis, Zhu, and Lai (2011), supply chain sustainability orientation involves integrating environmental and social considerations into the core business processes, contributing to improved overall performance. Sustainable practices in the supply chain have been associated with operational efficiency, cost savings, and enhanced reputation (Seuring & Müller, 2008). Organizations embracing sustainability principles often experience benefits such as reduced waste, energy efficiency, and increased customer satisfaction, all of which can positively influence operational aspects (Pagell & Wu, 2009).

Furthermore, a study by Carter and Rogers (2008) emphasizes the positive correlation between sustainability-oriented practices and operational performance. Firms that incorporate sustainability considerations in their supply chain activities tend to achieve operational excellence through enhanced resource utilization and reduced environmental impact.

In conclusion, the existing literature supports the hypothesis (H1) that there is a positive relationship between Supply Chain Sustainability Orientation and Operations at the Tema Port. Sustainable practices are likely to contribute positively to operational efficiency, aligning with the principles of resource optimization and environmental responsibility.

H1: There is a positive relationship between Supply Chain Sustainability Orientation and Operations.

2.5.2 SC Sustainability Orientation and Information Sharing

The formulation of H2 focuses on exploring the relationship between Supply Chain Sustainability Orientation (SCSO) and Information Sharing at the Tema Port, with attention to the moderating role. This hypothesis is grounded in existing academic literature that sheds light on the connection between sustainability practices and information sharing within supply chains. Research by Zimmer et al. (2019) suggests that supply chain sustainability practices positively influence information sharing among supply chain partners. Sustainability-oriented firms tend to foster greater collaboration and transparency, leading to improved information exchange. Such practices contribute to shared goals, mutual understanding, and collaborative decision-making, creating a positive environment for effective information sharing (Carter & Easton, 2011). Moreover, Seuring and Müller (2008) argue that sustainability-oriented supply chain management encourages open communication and collaboration. This aligns with the idea that firms embracing sustainability are more likely to engage in information sharing activities, creating a foundation for effective and efficient operations (Pagell & Wu, 2009). In

conclusion, the existing literature supports the hypothesis (H2) that there is a positive relationship between Supply Chain Sustainability Orientation and Information Sharing at the Tema Port. Sustainable practices are likely to enhance collaboration and transparency, fostering effective information exchange, especially in the context of the maritime operations.

H2: there is a positive relationship between Supply Chain Sustainability Orientation and Information Sharing.

2.5.3 Moderating role of information Sharing on the relationship beween SC Sustainability and Orientation Operation.

The formulation of H3 involves investigating how Information Sharing moderates the relationship between Supply Chain Sustainability Orientation and Operations at the Tema Port. Existing academic literature provides insights into the moderating role of information sharing in the context of sustainability and operational outcomes within supply chains. Research by Srivastava, Faqih, and Kumar (2015) suggests that effective information sharing acts as a moderator, strengthening the positive relationship between sustainability practices and operational performance. In sustainable supply chain management, the moderating effect of information sharing is vital for facilitating collaboration, reducing uncertainties, and enhancing the overall effectiveness of supply chain activities (Pagell & Wu, 2009). Additionally, Sarkis, Zhu, and Lai (2011) emphasize the importance of information sharing in shaping the impact of sustainability practices on operational outcomes. Information sharing acts as a catalyst for translating sustainability-oriented initiatives into tangible operational benefits. The study suggests that when information sharing is actively facilitated, the positive effects of supply chain sustainability on operations are magnified. In conclusion, the existing literature supports the hypothesis (H3) that Information Sharing moderates the relationship between Supply Chain Sustainability Orientation and Operations at the Tema Port. Effective information sharing is

likely to strengthen the positive impact of sustainability practices on operational outcomes, highlighting the interconnected nature of these variables.

H3: Effective information sharing is likely to strengthen the positive impact of sustainability practices on operational outcomes.

CHAPTER THREE

RESEARCH METHODOLOGY AND PROFILE OF STUDY INDUSTRY

3.1 Introduction

This section of the study presents the methodology and profile of the study industry. The research methodology presents the various procedures and methods for achieving the research objectives. The chapter examines the research design, research approach, population of the study, sampling techniques and sample size, the data collection method, data analysis, and profile of the study industry.

3.2 Research Design

According to Akhtar (2019), research design can be considered as the structure of research it is the glue that holds all the elements of the research project together. The approach of the study is qualitative and the approach used was survey. Thus, it is a plan for the proposed research work. The research design is the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with procedures. The type of research design includes exploratory research design, descriptive research, and explanatory research design. Exploratory research design is conducted to achieve new insights into a phenomenon. Thus, the exploratory research design is one which has the purpose of formulating a problem for more accurate investigation a problem for more accurate investigating a problem for more accurate investigation, or for developing a hypothesis. A descriptive research design is conducted to describe phenomena as they exist. Thus, descriptive research is used to identify and obtain information on the characteristics of a particular person. Explanatory research design explores a new universe one that has not been studied earlier. The study examines the effect of supply chain sustainability orientation on operation at the team port. The moderating role of information sharing. Considering the specific objectives of the

study are to examine the effect of supply chain sustainability orientation on the operation, the effect of supply chain sustainability on information sharing, and examining the moderating role of information sharing on supply chain sustainability and operation, the researcher employed explanatory research design. It enables the researcher to examine the relationship between the variables involved in the study.

3.3 Population of the study

The population is defined as an aggregate or totality of all the objects, subjects, or members that conform to a set of specifications (Polit and Hungler, 1999). The population of interest in the study's target population that it intends to study or treat. A research population is generally a large collection of individuals or objects that is the main focus of a study. In this study, the population includes 200 respondents.

3.4 Sample size and sampling techniques

Sampling is related to the selection of a subset of individuals from within a population to estimate the characteristics of the whole population (Kish, 2018). Sampling is a process of systematically selecting cases for research projects. A sample is a selection of data chosen from all that is possibly available. Researchers use two major sampling techniques: probability sampling and non-probability sampling techniques. With probability sampling, the researcher can specify the probability of respondents being included in the sample. Also, in non-probability sampling, there is no way of estimating the probability of all elements being included in a sample. This study employed probability sampling techniques. Therefore, a random sampling technique is employed for the study. With random sampling techniques, all the respondents in the population have an equal chance of being selected for the study. Also, in this method of sampling, each respondent included in the sample had a certain per assigned

chance of inclusion in the sample. This sampling provides a better estimate of parameters in the studies in comparison to purposive sampling.

Sample size determination is the essential step of the research methodology. The sample size is the act of choosing the number of replicates to include in a statistical sample. According to Ding et al., (1995), a minimum sample of 100 to 150 respondents is acceptable. Also, a population of 200 respondents was considered for the study. The population of the study includes respondents selected from the procurement department and other employees that have adequate knowledge in relation to the research topic. Using random sampling techniques, a sample size of 150 respondents was considered for the study.

3.5 Data Collection Method

The data collection method is the procedure of collecting, measuring, and analyzing accurate insights for research using standard validated techniques. Also, data collection is the process of gathering and analyzing accurate data from various sources to find answers to research problems, trends, and probabilities to evaluate possible outcomes. There are many ways to collect information when doing research. The data collection methods that the researcher chooses depend on the research question and research objectives. Some of the data collection methods include a questionnaire, observation, interview, and others. This study employed questionnaire.

3.5.1 Questionnaire Design

A questionnaire is a data collection instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. The primary purpose of a questionnaire is to help extract data from respondents. Also, it serves as a standard guide for respondents who need to the question in exactly the same way. The questionnaire is also a list of printed questions that are completed by or for a respondent to give his or her opinion.

According to Rani (2018), the questionnaire is the main means of collecting quantitative primary data. The use of a questionnaire enables quantitative data to be collected in a standardized way so that the data are internally consistent and coherent for analysis. A questionnaire should always have a definite purpose that is related to the objectives of the research and it needs to be clear from the outset how the findings was used. The questionnaire includes the following sections: section one: background information of the respondents: section two: determining the effect of supply chain sustainability orientation on the operation; section two: determining the effect of supply chain sustainability on information sharing and section three: the moderating role of information sharing. Using a Likert of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree, and 5-strongly agree to the following statement that measures the supply chain sustainability, information sharing, and operation.

3.6 Data Analysis

Data analysis is the practice of working with data to glean useful information which can then be used to make an informed decision. Data analysis in research fulfills an important part by summarizing the collected data. The data analysis involves a process of modeling, cleaning, and changing data to discover useful information that will be profitable for decision-making. Data were entered in data analysis so that replies could be categorized into a finite number of groups and examined using a statistical package of social science (SPSS). Both tabular and narrative presentations of the data were made. Regression analysis will be used to accomplish all of the research goals for this study. Regression analysis is a tool that allows researchers to look at the relationships between all the study's variables. The descriptive analysis would also be used to examine how respondents responded to each research variable.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

The study examines the data presentation, analysis and discussion of findings. The examines the effect of supply chain sustainability orientation on operations. The moderating role of information sharing. The questionnaire was designed to capture information about the research objective which includes: examining the effect of supply chain sustainability orientation on the operation, determining the effect of supply chain sustainability on information sharing and examining the moderating role of information sharing on supply chain sustainability and operations. The questionnaire was administered and answered by 150 respondents.

The respondents were requested to respond to the questions using a Likert Scale of 1-5, 1-strongly disagree, 2-disgree, 3-not sure, 4-agree and 5-strongly agree to the statement that measures supply chain sustainability orientation, information sharing, and operation. Also, the background information of the respondents was presented using frequency distribution table and percentages.

4.2 Background information of the respondents

The background information of the study relates to gender, age of the respondents, highest educational level, marital status and years of operation in the organization. Table 4.1 presents the background information of the study.

Table 4.1 Background information of the respondents

Demographic	Characteristic	Frequency	Percentage
Gender	Female	74	49.3
	Male	76	50.7
	Total	**150**	**100**
Age	21-30 years	11	7.3
	31-40 years	42	28.0
	41-50 years	47	31.3
	51-60 years	50	33.3
	Total	**150**	**100**
Marital Status	Single	45	30.0
	Married	105	70.0
	Total	**150**	**100**
Educational Level	SH	11	7.3
	Diploma	26	17.3
	Post Basic	5	3.3
	Bachelor Degree	70	46.7
	Master's Degree	38	25.3
	Total	**150**	**100**
Years of Working	1-5 years	48	32.0
	6-10 years	16	10.7
	11-15 years	63	42.0
	16-20 years	23	15.3
	Total	**150**	**100**

Source: Field study (2023)

In terms of background information, 74 of the respondents (49.3 percent) were female, while 76 of the respondents (50.7 percent) were male. This result implies that the majority of the study's participants were female. The respondents indicated their ages, with 11 representing 7.3 percent being between 21-30 years, 42 representing 28 percent being between 31-40 years, 47 representing 31.3 percent being between 41-50 years, and 50 representing 33.3 percent being

between 51-60 years. The age of the respondents is required for this study because it provides an overview of the age group involved in this study. The majority of respondents were between the ages of 41 and 50. This indicates that the majority of the respondents chosen for the study were adults with extensive experience and knowledge of the research topic.

Furthermore, the results revealed that 45 of the respondents (30%) were single, while 105 of the respondents (70%) were married. With regard to the respondents' educational qualifications, 11 of them represented 7.3 percent, 26 of them represented 17.3 percent, 5 of the respondents had completed basic school education, 70 of the respondent's represented 46.7 percent were degree holders, and 38 of the respondent's represented 25.3 percent were master's degree holders. This result revealed that the vast majority of respondents held a degree. It also implies that the Traditional council employs a greater number of degree holders. Most degree holders have adequate knowledge, and as a result, they can provide appropriate answers for the study. Again, respondents were asked to indicate how long they had been with the organization. The results revealed that 48 of the respondents (32%) have worked in the organization for 1-5 years, 16 of the respondents (10.7%) have worked for 6-10 years, 63 of the respondents (42%), have worked for 11-15 years, and 23 of the respondents (15.3%) have worked for 16-20 years. Working experience also indicates how long employees have been with the company.

4.3 Descriptive Statistics in Supply Chain Sustainability Orientation

Supply Chain Sustainability Orientation refers to the strategic commitment of organizations to integrate environmental and social considerations into their supply chain processes (Sarkis, Zhu, & Lai, 2011). This involves adopting practices that minimize environmental impact, promote ethical sourcing, and ensure long-term economic, social, and environmental sustainability. Using a Likert scale of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree

and 5-strongly agree to the following statement that measures supply chain sustainability orientation. Table 4.1 presents the supply chain sustainability orientation.

Table 4.2 Descriptive Analysis results for Supply Chain Sustainability Orientation

Economic dimension of supply chain sustainability orientation	**Mean**	**Standard deviation**
Our supplier has the ability to supply the right amount/quantity specified	4.14	1.135
Our supplier ensures that lean production (total waste avoidance) is the core of all internal operations	4.84	1.162
Our supplier ensures that there are control systems in place to ensure process suitability/stability	4.93	1.179
We make full use of available warehouse height for cartons, pallets and racking and share excess space with other users	4.56	1.271
Our supplier has good cost control/reduction efforts with good costs performance relative to the industry	4.89	1.101
We optimize the efficiency of picking methodology in the warehouse	4.15	1.314
We implement automated storage and mechanical handling systems powered by alternative energy.	4.32	1.070
We frequently clean/ disinfect/ fumigate the warehouse	4.24	1.309
Environmental dimension of supply chain sustainability orientation		
Adopts techniques to measure and reduce energy consumption from lights, heating, ventilation, and air conditioning	3.80	1.063
Adopts techniques to improve the energy efficiency of loading processes.	4.37	1.089
We ensure the discrepant operational offices/depot warehouses are regularly sanitized to avoid cocoa beans from infections	4.38	1.109
We ensure the verification of supplier compliance with environmental legislation	4.67	1.274
We prioritize suppliers that provide re-usable or recyclable packaging	4.70	1.021

We ensure that potential suppliers themselves source from environmentally friendly sub-suppliers	4.23	1.169
We consciously seek suppliers that outperform their competitors regarding emission or waste levels	4.60	1.237
Social dimension of supply chain sustainability orientation		
We understand and comply with applicable transportation safety regulations	4.63	1.08
Staff of suppliers are paid a salary that is clearly above the minimum wage	4.38	1.107
Our organization have adequate working conditions at supplier site is ranked as a key selection criterion	4.60	1.272
Management Recognizes & respects employees' freedom of association, right to collective bargaining & right to freely choose their representatives with no discrimination	4.78	1.192
We train warehouse workers on safe handling and storage of hazardous materials	4.54	1.065

Source: Field study (2023)

Supply chain sustainability orientation has three dimension which includes economic dimension, environmental dimensions and social dimension. For economic dimension of supply chain sustainability orientation. The mean score of 4.14 and a standard deviation of 1.135 shows that majority of the respondents agreed that their supplier has the ability to supply the right amount/quantity specified to them in the organization. The mean score of 4.84 and a standard deviation of 1.162 shows that most of the respondents agreed that their supplier ensures that lean production (total waste avoidance) is the core of all internal operations. The mean score of 4.93 and a standard deviation 1.179 shows that most of the respondents agreed that supplier ensures that there are control systems in place to ensure process suitability/stability. The mean score of 4.56 and a standard deviation of 1.27 implies that most of the respondents agreed that they make full use of available warehouse height for cartons,

pallets and racking and share excess space with other users. The mean score of 4.89 and a standard deviation of 1.101 indicates that most of the respondents agreed that their supplier has good cost control/reduction efforts with good costs performance relative to the industry. The mean score of 4.15 and a standard deviation of 1.31 shows that most of the respondents agreed that they optimize the efficiency of picking methodology in the warehouse. The mean score of 4.32 and a standard deviation of 1.07 shows that most of the respondents agreed that they implement automated storage and mechanical handling systems powered by alternative energy. The mean score of 4.24 and a standard deviation of 1.30 shows that most of the respondents agreed that they frequency clean/ disinfect/ fumigate the warehouse.

The mean score of 3.80 and a standard deviation of 1.06 shows that majority of the respondents were uncertain if they adopt techniques to measure and reduce energy consumption from lights, heating, ventilation, and air conditioning. The mean score of 4.37 and a standard deviation of 1.08 shows that most of the respondents agreed that they adopt techniques to improve the energy efficiency of loading processes. The mean score of 4.38 and a standard deviation of 1.109 shows that most of the respondents agreed that they ensure the discrepant operational offices/depot warehouses are regularly sanitized to avoid cocoa beans from infections. The mean score of 4.67 and a standard deviation of 1.27 shows that majority of the respondents agreed that they ensure the verification of supplier compliance with environmental legislation. The mean score of 4.70 and a standard deviation of 1.021 shows that most of the respondents agreed that they prioritize suppliers that provide re-usable or recyclable packaging. The mean score of 4.23 and a standard deviation of 1.169 shows that most of the respondents agreed that they ensure that potential suppliers themselves source from environmentally friendly sub-suppliers. The mean score of 4.60 and a standard deviation of 1.23 shows that most of the respondents agreed that they consciously seek suppliers that outperform their competitors regarding emission or waste levels.

The last dimension was social dimension. The mean score of 4.63 and a standard deviation of 1.08 shows that majority of the respondents agreed that they understand and comply with applicable transportation safety regulations. The mean score of 4.38 and a standard deviation of 1.10 shows that most of the respondents agreed that their staff of suppliers are paid a salary that is clearly above the minimum wage. The mean score of 4.60 and a standard deviation of 1.27 shows that most of the respondents agreed that their organization have adequate working conditions at supplier site is ranked as a key selection criterion. The mean score of 4.78 and a standard deviation 1.19 shows that most of the respondents agreed that management recognizes and respect employees' freedom of association, right to collective bargaining & right to freely choose their representatives with no discrimination. The mean score of 4.54 and a standard deviation of 1.065 shows that most of the respondents agreed that they train warehouse workers on safe handling and storage of hazardous materials.

4.4 Descriptive Statistics for Information Sharing

Using a Likert scale of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree and 5-strongly agree to the following statement that information sharing. Table 4.2 presents the information sharing.

Table 4.3 Descriptive Statistics for Information Sharing

Statement	**Mean**	**Standard deviation**
Our business units routinely share information knowledge, ideas and/or resources with each other	4.63	1.18
We have adequate ability to share both standardized and customized information internally	4.38	1.17

Our organization's structure facilitates seamless communication between functions/ departments	4.60	1.72
We share the costs of information sharing with our partners (suppliers and customers)	4.78	1.19
We have a clear agreement with our partners (suppliers and customers) to deal with any risk of information sharing	4.54	1.65
We and our partners have mechanisms to align benefits, risks and costs of information sharing	3.80	1.63
We regularly solve problems jointly with our supplier	4.37	1.89
We facilitate customers' ability to seek assistance from us	4.38	1.19
We inform key suppliers in advance of changing needs	4.67	1.74
We and our key suppliers exchange information that helps the establishment of sustainable development.	4.70	1.21

Source: Field Study (2023)

The mean score of 4.63 and a standard deviation of 1.18 shows that most of the respondent agreed that their business units routinely share information knowledge, ideas and resources with each other in the organization. The mean score of 4.38 and a standard deviation of 1.17 shows that most of the respondents agreed that they have adequate ability to share both standardized and customized information internally. The mean score 4.60 and a standard deviation 1.72 shows that majority of the respondents agreed that their organization's structure facilitates seamless communication between functions and department. The mean score of 4.78 and a standard deviation of 1.19 shows that majority of the respondents agreed that they share the costs of information sharing with our partners (suppliers and customers). The mean score of 4.54 and a standard deviation of 1.65 implies that most of the respondents agreed that the

have a clear agreement with their partners which include supplier and customers to deal with any risk of information sharing.

The mean score of 3.80 and a standard deviation of 1.63 shows that most of the respondents were uncertain that they and their partners have mechanism to align benefits, risk and cost of information sharing in the organization. The mean score of 4.37 and a standard deviation of 1.89 revealed that majority of the respondents agreed that they regularly solve problems jointly with our supplier. The mean score of .4.38 and a standard deviation of 1.19 shows that most of the respondents agreed that they facilitate customers' ability to seek assistance from them. The mean score of 4.67 and a standard deviation of 1.74 shows that majority of the respondents agreed that they inform key suppliers in advance of changing needs in the organization. The mean score of 4.70 and a standard deviation of 1.21 shows that most of the respondents agreed that they and their key suppliers exchange information that help the establishment of sustainable development.

4.5 Descriptive Statistics for Operations

Using a Likert Scale of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree and 5-strongly agree to the following statement that measures operation in the organization.

Table 4.4 Descriptive Statistics for Operations

Statement	Mean	Standard deviation
There is regular inspection of machines and facilities	4.83	1.06
Our organization has standardized maintenance checklists	4.10	1.67
There are scheduled regular maintenance and inspections	4.38	1.70

All employees are encouraged to check the quality of each operation they complete before proceeding to the next operation	4.08	1.04
Is the organization keen on removing and / or improving inefficient activities?	3.74	1.12
Our organization has flexibility in adapting to different production capacity	4.41	1.70
Our organization is able to collect valuable information and to effectively interface with production processes	4.52	1.58
There is continuous improvement on handling of all activities within the organization.	4.38	1.70
Internal lean management is a powerful practice for the optimal utilization of production assets and human capital	4.88	1.43
A continuous improvement culture can facilitate improved operational performance, particularly in the areas of quality and productivity	4.91	1.81

Source: Field study (2023)

The mean score of 4.83 and a standard deviation of 1.06 shows that majority of the respondents agreed that there is regular inspection of machines and facilities. The mean score of 4.10 and a standard deviation of 1.67 revealed that majority of the respondents agreed that their organization has standardized maintenance and inspection in the organization. The mean score of 4.08 and a standard deviation of 1.04 shows that most of the respondents agreed that all employees are encouraged to check the quality of each operation they complete before proceeding to the next operation. The mean score of 3.74 and a standard deviation of 1.12 shows that most of the respondents agreed that their organization is keen on removing and improving inefficient activities.

The mean score of 4.41 and a standard deviation of 1.70 indicates that most of the respondents agreed that their organization has flexibility in adapting to different production capacity in the organization. The mean score of 4.52 and a standard deviation of 1.58 revealed that most of the respondents agreed that their organization is able to collect valuable information and to effectively interface with production processes. The mean score of 4.38 and a standard deviation of 1.70 revealed that most of the respondents agreed that there is continuous improvement on handling of all activities within the organization. The mean score of 4.88 and a standard deviation of 1.43 shows that most of the respondents agreed that internal lean management is a powerful practice for the optimal utilization of production assets and human capital. The mean score of 4.91 and a standard deviation of 1.81 shows that revealed that most of the respondents agreed that there is continuous improvement culture can facilitate improved operational performance, particularly in the areas of quality and productivity.

4.6 Regression analysis

The regression analysis is done to examine to examine the relationship between the variables involved in the study. This regression analysis examining the effect of supply chain sustainability orientation on the operation, determining the effect of supply chain sustainability on information sharing and examining the moderating role of information sharing on supply chain sustainability and operations.

4.6.1 Supply chain sustainability orientation and operations

This regression analysis examined the relationship between supply chain sustainability orientation and operation. The results are displayed in Table 4.5, Table 4.6 and Table 4.7.

Table 4.5 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.555[a]	.308	.304	.73144

a. Predictors: (Constant), Supply Chain Sustainability Orientation

Source: Field data (2023)

Table 4.6 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.338	1	42.338	79.136	.000[b]
	Residual	95.232	178	.535		
	Total	137.570	179			

a. Dependent Variable: Operation

b. Predictors: (Constant), Supply Chain Sustainability Orientation

Source: Field data (2023)

Table 4.7 Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.153	.455		.335	.738

	Supply Chain Sustainability Orientation	.999	.112	.555	8.896	.000

a. Dependent Variable: Operation

Source: Field data (2023)

The regression analysis examined the relationship between supply chain sustainability orientation and operations. The adjusted r-square of .304 revealed that 30.4% of supply chain sustainability orientation can be employed to explain operations in the organization. The ANOVA table 4.8 provides the p-value as well as the f-ratio. The f-ratio and significant value of 0.000 shows that there is a significant between supply chain sustainability orientation and operation. Thus, supply chain sustainability orientation has an influence on operation in the organization. Also, with the coefficient table, the beta value of .555 shows that there is a positive relationship between supply chain sustainability orientation and operation. Generally, the regression analysis shows that there is a positive and significant relationship supply chain sustainability orientation and operations in the organization.

4.6.2 Supply Chain Sustainability Orientation and Information Sharing

The regression analysis examines the relationship between supply chain sustainability orientation on information sharing. The results are display Table 4.8, Table 4.9 and Table 4.10.

Table 4.8 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.016[a]	.113	.115	.87901

a. Predictors: (Constant), **Supply chain sustainability orientation**

Source: Field data (2023)

Table 4.9 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.036	1	.036	12.047	.002[b]
	Residual	137.534	178	.773		
	Total	137.570	179			

a. Dependent Variable: Information Sharing

b. Predictors: (Constant), Supply chain sustainability orientation

Source: Field data (2023)

Table 4.11 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.281	.521		8.212	.000
	Supply chain sustainability orientation	-.027	.125	.116	-.216	.829

a. Dependent Variable: Information Sharing

Source: Field data (2023)

This section examined the relationship between supply chain sustainability orientation and information sharing. The adjusted r-square of .115 shows that 11.5% of supply chain sustainability orientation can be explain information sharing in the organization. Again, the f-ratio of 12.047 significant value of .0002 shows that there is a significant relationship supply

chain sustainability orientation and information sharing. This implies that there is significant relationship between supply chain sustainability orientation and information sharing. In other words, supply chain sustainability orientation has an influence on information sharing in the organization. Also, the beta value of .116 shows that there is a positive relationship supply chain sustainability orientation and information sharing. Overall, the result shows that there is a positive relationship between supply chain sustainability orientation and information sharing.

4.6.3 Moderating role of information sharing on supply chain sustainability orientation and operations

The relationship between the moderating variable of information sharing on supply chain sustainability orientation and operation. In moderating analysis, the supply chain sustainability orientation and information and examine the relationship between information sharing and operation. With the relationship between supply chain sustainability orientation and operation, a p-value of ($0.03 < 0.05$), shows that there is a significant relationship between supply chain sustainability orientation and operation. Also, with an adjusted R^2 of .812, shows that 81.2% of supply chain sustainability orientation can be used to explain operations.

In addition, the relationship between information sharing and operation, the p-value of ($0.00 < 0.05$) this indicates that there is a significant relationship between information sharing and operation. Also, with an adjusted R^2 of .625, shows that 62.5% total variation in information sharing can be employed to explain operation in the organization. Moreover, the moderating effect was further examined. The moderating role information sharing on supply chain sustainability orientation and operation. The p-value ($0.00 < 0.43$) shows that there is a significant relationship between the moderating variable and supply chain sustainability orientation and operation. Also, the an adjusted R^2 of .680, implies that 68% total variation in information sharing can be explained by supply chain sustainability and operation. Therefore,

it can be concluded that information sharing moderates supply chain sustainability and operation.

Table 4.10 Moderating role of information sharing on supply chain sustainability and operations

Variable	Model 1	Model 2	Model 3
Control paths			
Gender	0.63 (.984)	0.31(.793)	.038 (.117)
Age	0.43 (.151)	0.81(.485)	.070 (.108)
Level of Education	0.51 (.075)	.154 (.259)	.025 (.097)
Hypothesis paths			
Main effects			
SCS Orientation* Information Sharing	.058 (.003)		
Information sharing* Operation		.085 (.000)	
Moderator effect			
SCS Orientation*IS*Operation			.142(0.002)
Fit indices			
R^2	.420	.286	.186
ΔR^2	.230	.621	.674
Adjusted R^2	.221	.625	.680
F statistics	26.575	7.825	6.911
DF	90	199	199

Source: Field study (2023)

Note:

P-values are in parentheses

β-values are before the parenthesis

4.7 Discussion of Results

The discussion of results is based on the research objectives. The research objectives include the following: examining the effect of supply chain sustainability orientation on the operation, determining the effect of supply chain sustainability on information sharing and examining the moderating role of information sharing on supply chain sustainability orientation and operations.

4.7.1 The Effect of Supply Chain Sustainability Orientation on Operations

The findings of the study there is a positive and significant relationship between supply chain sustainability orientation and operation. Most of the respondents agreed to the following statement that measures that measures operations: There is regular inspection of machines and facilities, the organization has standardized maintenance checklists, there are scheduled regular maintenance and inspections, employees are encouraged to check the quality of each operation they complete before proceeding to the next operation, organization has flexibility in adapting to different production capacity, organization is able to collect valuable information and to effectively interface with production processes, There is continuous improvement on handling of all activities within the organization, Internal lean management is a powerful practice for the optimal utilization of production assets and human capital and continuous improvement culture can facilitate improved operational performance, particularly in the areas of quality and productivity.

By adopting sustainable practices, companies can reduce their carbon footprint, minimize waste generation, conserve natural resources, and mitigate pollution (Singh et al., 2019). This includes implementing measures such as energy-efficient transportation, sustainable packaging, waste reduction, and recycling initiatives. These efforts contribute to overall environmental conservation and help combat climate change. Sustainability-oriented supply

chain practices can lead to significant cost savings in the long term. According to Wang et al., (2019) optimizing transportation routes and reducing fuel consumption can lower logistics costs. Waste reduction and resource efficiency measures can reduce material and energy costs. Moreover, sustainability initiatives often encourage innovation and process optimization, which can result in improved operational efficiency and reduced expenses (Anderson et al., 2019).

Integrating sustainability into the supply chain can enhance a company's reputation and brand image. Consumers and stakeholders increasingly value and prioritize environmentally and socially responsible practices. By demonstrating a commitment to sustainability throughout the supply chain, companies can attract environmentally conscious customers, build stronger relationships with stakeholders, and differentiate themselves from competitors (Singh et al., 2019). Adopting sustainable supply chain practices can help mitigate risks associated with environmental regulations, supply chain disruptions, and reputational damage. Compliance with environmental and social standards reduces the likelihood of legal penalties, operational disruptions, and negative media coverage. Diversifying suppliers and building resilient supply networks can enhance supply chain stability and reduce the vulnerability to disruptions caused by climate events, natural disasters, or geopolitical issues (Cai et al., 2019) .

Pursuing supply chain sustainability often involves collaborating with suppliers, customers, and other stakeholders. This collaborative approach fosters innovation and knowledge sharing, leading to the development of more sustainable products, processes, and technologies. By working together, companies can tackle complex sustainability challenges, drive industry-wide change, and create new market opportunities (Stevens et al., 2019). Many countries and regions have implemented environmental and social regulations to promote sustainable practices. By aligning their supply chain operations with these requirements, companies can ensure regulatory compliance and maintain access to markets that prioritize sustainability. Non-

compliance may result in legal consequences, trade barriers, or exclusion from government procurement programs (Chow et al., 2019).

4.7.2 Relationship between Supply Chain Sustainability Orientation And Information Sharing

The regression analysis revealed that there is a positive and significant relationship between supply chain sustainability orientation and information sharing. Most of the respondents agreed to the following that measures supply chain sustainability orientation: supplier has the ability to supply the right amount/quantity specified, supplier ensures that lean production (total waste avoidance) is the core of all internal operations, supplier ensures that there are control systems in place to ensure process suitability/stability, they make full use of available warehouse height for cartons, pallets and racking and share excess space with other users, supplier has good cost control/reduction efforts with good costs performance relative to the industry, optimize the efficiency of picking methodology in the warehouse, implement automated storage and mechanical handling systems powered by alternative energy and frequently clean/ disinfect/ fumigate the warehouse.

The findings shows that most of the respondents agreed to the following statement that measures environmental dimension of supply chain sustainability orientation: Adopts techniques to improve the energy efficiency of loading processes, ensure the discrepant operational offices/depot warehouses are regularly sanitized to avoid cocoa beans from infections, ensure the verification of supplier compliance with environmental legislation, prioritize suppliers that provide re-usable or recyclable packaging, ensure that potential suppliers themselves source from environmentally friendly sub-suppliers and consciously seek suppliers that outperform their competitors regarding emission or waste levels.

Based on the findings of the study, most of the respondents agreed to the following statement that measures social dimension. Among the statements include: understand and comply with applicable transportation safety regulations, Staff of suppliers are paid a salary that is clearly above the minimum wage, organization have adequate working conditions at supplier site is ranked as a key selection criterion, Management Recognizes & respects employees' freedom of association, right to collective bargaining & right to freely choose their representatives with no discrimination and train warehouse workers on safe handling and storage of hazardous materials.

According to Tseng and Hung (2014), the demand from governments, customers, and numerous stakeholder groups over the last few decades has made it imperative that sustainability be incorporated into SCM. Additionally, Gold et al. (2009) showed how important issues in supply chain development, such as design, organization, interactions, competences, and capabilities should be given more attention because supply chains have a tendency to become more complex as a result of recent economic and globalization trends. Additionally, Defee et al. (2019) have outlined the features of CSR, which refers to how businesses should handle their economic goals in order to meet the demands of both society and the environment.

Supply chain sustainability orientation encourages companies to be transparent about their environmental and social practices throughout the supply chain (Kim et al., 2019). This involves sharing information about their sustainability goals, initiatives, and performance. Increased transparency fosters trust and collaboration among supply chain partners, enabling better decision-making and problem-solving. Supply chain sustainability orientation promotes collaboration and partnerships among supply chain stakeholders, including suppliers, manufacturers, distributors, and customers (Khan et al., 2018). Information sharing plays a crucial role in building these partnerships by facilitating the exchange of data, best practices,

and insights related to sustainability. Sharing information about sustainability initiatives, challenges, and innovations helps stakeholders align their efforts and work together towards common sustainability goals (Chavez et al., 2019).

Information sharing is essential for effective supply chain risk management, and sustainability orientation plays a role in this aspect as well. Sharing data and insights on sustainability risks, such as climate-related risks, resource scarcity, or regulatory changes, enables proactive risk identification and mitigation strategies (Viana et al., 2019). By exchanging information on sustainability-related risks and vulnerabilities, supply chain partners can collectively develop contingency plans, diversify suppliers, and build resilient supply chains. Supply chain sustainability orientation necessitates the measurement and reporting of sustainability performance indicators. Information sharing is vital for collecting accurate and reliable data from supply chain partners (Roh et al., 2019). Sharing data on environmental impacts, social performance, energy consumption, waste generation, and other sustainability metrics allows for comprehensive performance evaluation, benchmarking, and improvement efforts (Kim et al., 2017).

Supply chain sustainability orientation requires a commitment to continuous improvement. Information sharing facilitates the identification of areas for improvement and promotes knowledge exchange. By sharing experiences, successes, and failures, supply chain partners can learn from one another and implement best practices. This collaborative learning environment helps drive innovation, efficiency, and progress towards shared sustainability goals (Chavez et al., 2019). Sharing information related to compliance with sustainability regulations and standards is crucial for supply chain partners. Sustainability-oriented companies need to ensure that their suppliers comply with environmental and social requirements. Sharing information on compliance status, certifications, audits, and

sustainability performance enables better monitoring and verification of sustainable practices across the supply chain.

4.7.3 The moderating role of Information Sharing On the Relationship Between Supply Chain Sustainability Orientation And Operation

The findings revealed that information sharing moderate supply chain sustainability orientation and operation. The findings revealed that most of the respondents agreed to the following statement that measure information sharing in the organization: business units routinely share information knowledge, ideas and/or resources with each other, have adequate ability to share both standardized and customized information internally, organization's structure facilitates seamless communication between functions/ departments, share the costs of information sharing with our partners (suppliers and customers), have a clear agreement with our partners (suppliers and customers) to deal with any risk of information sharing, our partners have mechanisms to align benefits, risks and costs of information sharing, management have regularly solve problems jointly with our supplier, management facilitate customers' ability to seek assistance from us, inform key suppliers in advance of changing needs and we and our key suppliers exchange information that helps the establishment of sustainable development.

The moderating role of information sharing on supply chain sustainability orientation and operation refers to the influence that information sharing practices have on the relationship between a company's sustainability orientation and its operational practices within the supply chain (Barltett et al., 2019). Supply chain sustainability orientation refers to a company's strategic commitment and focus on integrating sustainable practices into its supply chain management. This includes considerations such as reducing carbon emissions, minimizing waste, using renewable resources, and promoting social responsibility (Lee et al., 2019).

Operational practices in the context of supply chain sustainability refer to the specific actions and processes that a company implements to achieve its sustainability goals (Kelso et al., 2018). This can include measures such as selecting environmentally friendly suppliers, implementing energy-efficient transportation, adopting green packaging, and optimizing resource usage throughout the supply chain. Information sharing plays a crucial role in enhancing collaboration and coordination within the supply chain (Chen et al., 2019). It involves the exchange of relevant data, knowledge, and insights among supply chain partners, including suppliers, manufacturers, distributors, and customers. Effective information sharing enables better visibility, communication, and decision-making across the supply chain.

The moderating role of information sharing suggests that the extent to which information is shared among supply chain partners can impact the relationship between a company's sustainability orientation and its operational practices. In other words, information sharing acts as a catalyst or amplifier for the implementation of sustainable practices within the supply chain (Liu et al., 2019). When information sharing is high, it facilitates better coordination and collaboration among supply chain partners, enabling them to align their sustainability goals and operational practices more effectively. For example, suppliers can share information about their environmental certifications, enabling manufacturers to make informed decisions in selecting sustainable suppliers. Similarly, manufacturers can share information about their energy-efficient processes, enabling distributors to optimize transportation routes and reduce carbon emissions.

On the other hand, when information sharing is low or inadequate, it can hinder the implementation of sustainable practices within the supply chain. Lack of information can lead to misalignment and inefficiencies, making it difficult for companies to adopt and execute sustainable initiatives. For instance, if suppliers do not share information about their sustainable practices, manufacturers may not have access to the necessary data to make

environmentally conscious sourcing decisions (Yang et al., 2017). Therefore, effective information sharing acts as a moderator by strengthening the relationship between supply chain sustainability orientation and operational practices. It enables companies to leverage shared knowledge, collaborate on sustainability initiatives, and drive improvements throughout the supply chain (Bao et al., 2018).

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.1 Introduction

The last section of the study presents the summary of findings, conclusion and recommendation. The summary of findings is based on the research objective and the conclusion and recommendation is based on the findings of the study.

5.2 Discussion of findings

The discussion of findings is based on the research objectives. The research objectives include the following: examining the effect of supply chain sustainability orientation on the operation, determining the effect of supply chain sustainability on information sharing and examining the moderating role of information sharing on supply chain sustainability orientation and operations.

5.2.1 The effect of Supply Chain Sustainability Orientation on Operations

The findings of the study there is a positive and significant relationship between supply chain sustainability orientation and operation. Most of the respondents agreed to the following statement that measures that measures operations: There is regular inspection of machines and facilities, the organization has standardized maintenance checklists, there are scheduled regular maintenance and inspections, employees are encouraged to check the quality of each operation they complete before proceeding to the next operation, organization has flexibility in adapting to different production capacity, organization is able to collect valuable information and to effectively interface with production processes, There is continuous improvement on handling of all activities within the organization, Internal lean management is a powerful practice for the optimal utilization of production assets and human capital and continuous improvement culture

can facilitate improved operational performance, particularly in the areas of quality and productivity.

5.2.2 Relationship between Supply Chain Sustainability Orientation on Information Sharing

The regression analysis revealed that there is a positive and significant relationship between supply chain sustainability orientation and information sharing. Most of the respondents agreed to the following that measures supply chain sustainability orientation: supplier has the ability to supply the right amount/quantity specified, supplier ensures that lean production (total waste avoidance) is the core of all internal operations, supplier ensures that there are control systems in place to ensure process suitability/stability, they make full use of available warehouse height for cartons, pallets and racking and share excess space with other users, supplier has good cost control/reduction efforts with good costs performance relative to the industry, optimize the efficiency of picking methodology in the warehouse, implement automated storage and mechanical handling systems powered by alternative energy and frequently clean/ disinfect/ fumigate the warehouse.

The findings shows that most of the respondents agreed to the following statement that measures environmental dimension of supply chain sustainability orientation: Adopts techniques to improve the energy efficiency of loading processes, ensure the discrepant operational offices/depot warehouses are regularly sanitized to avoid cocoa beans from infections, ensure the verification of supplier compliance with environmental legislation, prioritize suppliers that provide re-usable or recyclable packaging, ensure that potential suppliers themselves source from environmentally friendly sub-suppliers and consciously seek suppliers that outperform their competitors regarding emission or waste levels.

Based on the findings of the study, most of the respondents agreed to the following statement that measures social dimension. Among the statements include: understand and comply with applicable transportation safety regulations, Staff of suppliers are paid a salary that is clearly above the minimum wage, organization have adequate working conditions at supplier site is ranked as a key selection criterion, Management Recognizes & respects employees' freedom of association, right to collective bargaining & right to freely choose their representatives with no discrimination and train warehouse workers on safe handling and storage of hazardous materials.

5.2.3 The moderating role of Information Sharing On Supply Chain Sustainability Orientation And Operation

The findings revealed that information sharing moderate supply chain sustainability orientation and operation. The findings revealed that most of the respondents agreed to the following statement that measure information sharing in the organization: business units routinely share information knowledge, ideas and/or resources with each other, have adequate ability to share both standardized and customized information internally, organization's structure facilitates seamless communication between functions/ departments, share the costs of information sharing with our partners (suppliers and customers), have a clear agreement with our partners (suppliers and customers) to deal with any risk of information sharing, our partners have mechanisms to align benefits, risks and costs of information sharing, management have regularly solve problems jointly with our supplier, management facilitate customers' ability to seek assistance from us, inform key suppliers in advance of changing needs and we and our key suppliers exchange information that helps the establishment of sustainable development.

5.3 Conclusion

The study examines the effect of supply chain sustainability orientation on operation. The moderating role of information sharing. Regression analysis was employed to examine the relationship between the variables involved in the study. The study concludes that there is a positive and significant relationship between supply chain sustainability orientation on the operation. The study further concludes that there is a positive and significant relationship between supply chain sustainability on information sharing. Again, the study concludes that there information sharing moderate the relationship supply chain sustainability orientation and operations in the organization.

5.4 Recommendation

The following recommendation are based on the research findings:

To obtain long-term advantages for focal enterprises and business partners in the supply chain, it is necessary to integrate the sustainability concept into SCM and work collaboratively on the triple bottom line (economic, social, and environmental dimensions). By improving employee and supplier education and training, the concept of sustainability should be emphasized in the business's culture. This will encourage all participants in the supply chain to take conscientious actions and will help the firm develop a sustainable reputation.

To enhance communication amongst all supply chain stakeholders, it is crucial and important to make continual SCM improvements. Internal stakeholders need to develop sustainable management system principles. Additionally, working together with business partners (supplier, investor) may push and drive the adoption of sustainability into SCM to become a reality. In order to lower the early expenses of implementing SSCM and jointly reap long-term advantages, these external stakeholders must improve communication, exchange information, and promote supply chain transparency.

One of the key components of integrating sustainability into the supply chain is green design, which may meet stakeholder expectations while having fewer negative effects on the environment. As a result, the connection between suppliers and focus firms should be the key to implementing sustainable practices in the supply chain. Therefore, a strong supply connection can result in favorable environmental effects, cost savings, flexible needs, efficient operations, and a decrease in carbon emissions. Since carbon emissions play a significant role in global warming, industrial enterprises must keep an eye on their air emissions. By implementing lean manufacturing processes, suppliers may increase environmental sustainability by using fewer resources, promoting green procurement, using less energy, and ultimately emitting less greenhouse gases.

REFERENCES

Abbasi, M. U. (2019). Barriers to implementing sustainability in the supply chain: An assessment of Pakistani organizations. Sustainability, 11(16), 4474–4493.

Aiginger, K., Bärenthaler-Sieber, S., & Vogel, J. (2018). Competitiveness under new perspectives. Empirica, 45(2), 317-366. DOI 10.1007/s10663-018-9396-0

Akhtar, P. (2019). What is research design? Department of Economics Working Paper Series.

Akroush, M. N. (2017). Customer knowledge management and organizational learning capability: an empirical investigation. Business Process Management Journal, 23(3), 557-582.

Alavi, M., & Leidner, D. E. (2001). Knowledge management and knowledge management systems: Conceptual foundations and research issues. MIS Quarterly, 25(1), 107-136.

Ali, H. H., Leo, C., & Batra, R. (2017). A simultaneous study of information sharing and strategic sourcing in a supply chain. Industrial Marketing Management, 62, 60-71.

Anderson, C. L., Teoh, H. Y., & Waxman, B. (2019). Examining the effects of inventory practices on sustainability in supply chains: An event study approach. Journal of Operations Management, 65(8), 696-725.

Anderson, E. (2019). The supply chain transformation. The Journal of Commerce, 3, 11-17.

Anuar, M. K., Bhatti, M., Awan, M. U., & Anjum, M. U. (2019, March). The impact of sales forecast information sharing on supply chain performance. In 2019 International Conference on Computing, Mathematics and Engineering Technologies (iCoMET) (pp. 1-6). IEEE. DOI: 10.1109/ICOMET.2019.8672690

Awaysheh, A., & Klassen, R. D. (2017). Social issues in supply chains: The role of shared infrastructure. Journal of Management, 69(5), 4277-4376.

Bagchi, P. K., Chun, B. K., Skjoett-Larsen, T., & Boege Soerensen, L. (2019). Supply chain integration: A theoretical framework and research propositions. International Journal of Physical Distribution & Logistics Management, 35(3), 195-227.

Bai, C., & Sarkis, J. (2019). Flexibility-oriented manufacturing system for sustainable supply chain management. Journal of Cleaner Production, 243, 118561.

Ballou, R. H. (2018). The evolution and future of logistics and supply chain management. European Business Review, 14(5), 407-416.

Bao, Y., Zhou, X., & Bao, C. (2018). Green supply chain collaboration for cleaner production and better performance: Evidence from Chinese manufacturing firms. Journal of Cleaner Production, 174, 1456-1466.

Barltett, K. R., Windt, C., Burns, D. R., & Parsons, A. L. (2019). Supply chain sustainability: A framework for integration. Supply Chain Forum: An International Journal, 20(3), 189-201.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Cai, S., Jun, M., & Yang, Z. (2019). Improving supply chain sustainability by information sharing and environmental collaboration. Supply Chain Management: An International Journal, 16(2), 117-129.

Carter, C. R. (2018). Sustainable procurement: The status of the field and agenda for future research. Journal of Purchasing and Supply Management, 24(2), 87-95.

Chavez, R., Yu, W., & Jacobs, M. (2019). Supply chain risk management: a relationship perspective. International Journal of Production Research, 57(16), 4917-4934.

Chen, Y., Wei, H., & Wu, C. (2019). Supply chain network coordination through information sharing and rewards allocation. Transportation Research Part E: Logistics and Transportation Review, 128, 23-44.

Childerhouse, P., Hermiz, R., Mason-Jones, R., Popp, A., & Deakins, E. (2017). Information and communication technology enabled integration and flexibility in supply chains. Journal of Purchasing and Supply Management, 8(2), 57-67.

Chopra, S., & Meindl, P. (2017). Supply Chain Management (6th ed.). Pearson Education.

Chow, P. S., Arkun, E. S., Huang, Q., & Williams, M. (2019). Supply chain sustainability orientation and financial performance. Supply Chain Forum: An International Journal, 20(4), 251-266.

Christopher, M. (2018). Logistics & supply chain management. Pearson UK.

Christopher, M. (2019). Logistics & Supply Chain Management. New York: Pearson Education.

Ciegis, R., Ramanauskiene, J., & Startiene, G. (2018). Theoretical Reasoning of the Use of Indicators and Indices for Sustainable Development Assessment. Engineering Economics, 29(5). DOI:10.5755/j01.ee.29.5.20710

Clark, R. A., & Hammond, M. T. (2019). Business to business marketing management: A global perspective. Routledge.

Conner, K. R. (1991). A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm? Journal of Management, 17(1), 121-154.

Cooper, M. C., Lambert, D. M., & Pagh, J. D. (2018). Supply chain management: More than a new name for logistics. The International Journal of Logistics Management. 8(1), 1-14.

Dan, A. G., & Liu, S. (2017). Supply chain sustainability integration: A systematic literature review. Sustainability, 9(9), 1602.

Daugherty, P. J., Richey, R. G., Simon, J., & Hochstein, B. (2015). Effects of strategic sourcing on competitive advantage, business performance, and supplier-side performance. Transportation Journal, 42(1), 65-80

Defee, C. C., Esper, T., & Mollenkopf, D. (2019). Greening the supply chain: A theory of social exchange perspective. International Journal of Physical Distribution & Logistics Management. 49(1), 40-66.

Dibb, S., Simkin, L., Pride, W. M., Ferrell, O. C. (2019). Marketing Concepts and Strategies. Houghton Mifflin.

Ding, L., Velicer, W. F., & Harlow, L. L. (1995). Effects of estimation methods, number of indicators per factor, and improper solutions on structural equation modeling fit indices. Structural Equation Modeling: A Multidisciplinary Journal, 2(2), 119-143.

Forslund, H., & Jonsson, P. (2017). The impact of forecast information quality on supply chain performance. International Journal of Operations & Production Management, 27(1), 90-106.

Godfrey, P. C. (2018). Shared values. Strategic Direction, 3(1), 33-35.

Gold, S., Seuring, S., & Beske, P. (2009). Sustainable supply chain management and inter-organizational resources: A literature review. Corporate Social Responsibility and Environmental Management, 16(4), 230-245.

Gustin, C., Daugherty, P., & Stank, T. (2015). The effects of information availability on supply chain integration. Journal of Business Logistics, 16(1), 1-21.

Hopwood, B., Mellor, M., & O'Brien, G. (2018). Sustainable development - from social construction to social sustainability. The Sustainable Development Paradox, Chapter 10.

Hussain, M., Khurram, S., ul Haq, I., & Shahzad, F. (2017). Information sharing and supplier integration as antecedents of sustainable supply chain practices. Sustainability, 9(7), 1213.

Hussan, H., Rashed, M. S. U., Latif, S., Hussain, T., Anwar, H., & Latif, A. (2017). Impact of information sharing on supply chain management of procurement division. International Journal of Logistics Systems and Management, 28(4), 492-516.

Jung, H. (2019). Influence of environment consciousness on green supply chain orientation and performance. Management Decision, 57(5), 1222-1237.

Kamble, S. S., Gunasekaran, A., & Sharma, R. (2020). Modeling the barriers of sustainable supply chain management in Indian automotive industry using ISM approach: Greening along supply chain. International Journal of Production Economics, 219, 225-240.

Kelso, A., Moretto, A. C., Fisher, A., Hughes, T. C., & Densley Tingley, D. (2018). Achieving sustainable supply chains through supplier development: An organisational learning perspective. International Journal of Operations & Production Management, 38(1), 1763-1787.

Khan, A. M., Hussain, M., ur Rehman, K., & Mustafa, N. (2016). Relationship between supply chain integration and organizational performance. Pakistan Journal of Commerce and Social Sciences, 10(1), 45-64.

Khan, A., Lim, S., & Babovic, V. (2018). Modeling sustainable supply chain network design under demand uncertainty. International Journal of Production Economics, 195, 329-339.

Khanna, T., Palepu, K. G., & Sinha, J. (2018). Strategies that fit emerging markets. Harvard Business Review, 77(2), 63-76.

Khurana, A., Carter, L., Garg, R. (2011). Advanced supply chain management. Order Books India, 59-89.

Kim, D. Y., Cho, Y., & Lee, S. (2017). Sustainable supply chain management with stochastic demands and carbon emission regulations. Computers & Industrial Engineering, 102, 368-378.

Kim, E., Kim, K., & Kim, H. (2019). Social sustainability for sustainable supply chain management in the retail sector. Sustainability, 11(15), 4122.

Kish, L. (2018). Sampling organizations and groups of unequal sizes. American Sociological Review, 13(4), 564-572.

Lambert, D. M., & Cooper, M. C. (2018). Issues in Supply Chain Management. Industrial Marketing Management 29(1), 65-83.

Larson, P. D., Bowen, D. E., & Harrah, T. (2019). Effective supply chain management. Journal of Operations Management, 6, 1-36.

Lee, E. M., Mutlag, A. H., Mohammad, B. O., Al-Madi, F. M., & Gharaibeh, H. H. (2019). The impact of information sharing on supply chain sustainability. International Journal of Productivity and Performance Management, 68(5), 905-925.

Lee, H. L, So, K. C., & Tang, C. S. (2000). The value of information sharing in a two-level supply chain. Management Science, 42(3), 626-643

Lee, H. L., Padmanabhan, V., & Whang, S. (1997). Information distortion in a supply chain: The bullwhip effect. Management Science, 43(4), 546-558.

Lee, H. L., Padmanabhan, V., & Whang, S. (2017). The bullwhip effect in supply chains. Sloan Management Review, 38(3), 93-102.

Lee, H. L., So, K. C., & Tang, C. S. (2000). The value of information sharing in a two-level supply chain. Management Science, 46(5), 626-643.

Lee, H. L., Zhao, G. Y., & Rungtusanatham, M. (2019). Factors affecting information sharing and supply chain coordination: Evidence from a longitudinal study. Journal of Supply Chain Management, 49(4), 101-124.

Li, S., & Lin, B. (2006). Accessing information sharing and information quality in supply chain management. Decision Support Systems, 21(3), 459-483.

Li, Y., Gong, Z., & Dai, C. (2017). Information sharing in supply chain based on monopolistic competition: A game theoretical perspective. Omega Journal of Management Science, 64(3), 37-54.

Liu, X., Zhou, Q., & Yu, W. (2018). Supply chain sustainability in developing economies: Insights from Chinese state-owned vs privately-owned enterprises. Sustainability, 10(5), 1545.

Liu, Y., Chai, X., & Yang, Q. (2019). Supply chain sustainability coordination with demand and capacity uncertainties. Transportation Research Part E: Logistics and Transportation Review, 131, 262-279.

Löther, S. (2018). Understanding sustainability orientation in global supply chains. Business Strategy and the Environment, 27(5), 585-598.

Mason-Jones, R., & Towill, D. R. (2017). Information enrichment: Designing the supply chain for competitive advantage. Supply Chain Management, 2(4), 137-148.

Miller, A. (2015). Assessing supply chain information sharing using AHP. Journal of Information and Optimization Sciences, 26(1), 73-90.

Moberg, C. R., Cutler, B. D., Gross, A., & Speh, T. (2017). Identifying antecedents of information exchange within supply chains. International Journal of Physical Distribution & Logistics Management, 32(9), 755-770.

Monczka, R. M., Callahan, T. J., & Nichols, E. L. (2018). Supply chain management: Pathways for research and practice. International Journal of Physical Distribution & Logistics Management, 24(4), 322-335.

Motwani, J., Jiang, J., & Sower, V. (2018). Critical factors for successful implementation of big data analytics within organizations. Journal of Systems and Information Technology, 20(3), 270-288.

Nilsson, F. (2018). Integration of sustainability into supply chains. Supply Chain Management: An International Journal. 11(2), 149-159.

Ocampo, L., & Prada, A. (2019). Sustainable supply chain management: Improving the triple bottom line. European Journal of Sustainable Development, 8(2), 93-102.

Penrose, E. (1959). The Theory of the Growth of the Firm. Oxford: Basil Blackwell.

Polit, D. F., & Hungler, B. P. (1999). Sampling designs and methods. Essentials of Nursing Research: Methods, Appraisal, and Utilization, 337-362.

Rani, P. (2018). A comparative analysis of qualitative and quantitative research approaches. The Lamar Journal of Science and Technology, 3(6), 290-295.

Reefke, H., Wolf, S., & Sundaram, D. (2018). Sustainability across the supply chain: A perspective on partnerships. The Supply Chain Journal, 4(1), 22-28.

Rezaee, Z. (2016). Business sustainability research: A theoretical and integrated perspective. Journal of Accounting Literature, 36, 48-64.

Ritzman, L. P., Krajewski, L. J., Malhotra, M. K., & Ritzman, L. P. (2019). Foundations of Operations Management. Pearson.

Roh, J. J., Hong, P., & Min, H. (2019). Implementation of a responsive supply chain strategy in global supply chains. International Journal of Production Economics, 211, 71-86.

Roman, S. (2016). Value-chain collaboration and information sharing in emerging economies: Insights from the automotive industry in Thailand. Supply Chain Management: An International Journal. 21(5), 638–659.

Rosen, L., Schroeder, D., & Purinton, E. (2019). Supply chain sustainability in the US food system. Consortium for Food Sustainability Research Report.

Sagnak, M., Kazancoglu, I., & Ozkan-Ozen, H. (2018). A conceptual framework for sustainable supply chain management performance measurement framework. Procedia Manufacturing, 21, 476-483.

Seman, A. A., Zailani, S., Iranmanesh, M., & Nikbin, D. (2019). The impacts of supply chain internal and external integration on green supply chain management adoption. Production Planning & Control, 30(16), 1309–1323.

Shukla, P., Agrawal, S., & Patil, M. (2019). Sustainable supply chain management system for minimizing environmental impacts: An Indian case study. Journal of Environmental Management, 232, 641–658.

Simatupang, T. M., & Sridharan, R. (2001). Benchmarking supply chain collaboration. Benchmarking: An International Journal, 9(5), 439-458.

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2018). Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. McGraw-Hill.

Singh, S. K., Ganguly, K., Iruri, E., Yadav, S. P., & Nepal, B. (2019). Impact of sustainability dimensions on supply chain processes: empirical evidence from Indian pharmaceutical industry. Benchmarking: An International Journal. 27(1), 253-271.

Slack, N., Brandon-Jones, A., & Johnston, R. (2019). Operations management. Pearson Education.

Solow, R.M., (1974). The economics of resources or the resources of economics. American Economic Review, 64(2), 1-14.

Sonnenwald, D. H. (2016). "... but Jenny can work with anybody": A case study of information mediaries in collaborative work. In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (pp. 588-599).

Stevens, I., Fortwengel, J., & Harmeling, S. (2019). Driving sustainability innovation capability through governance selection: the role of network structure and conflict. Industrial Marketing Management, 77, 50-66.

Stock, J. R., Lambert, D. M., & Boyer S. D. (2018). Strategic Logistics Management. Irwin McGraw-Hill.

Thomas, D. J. & Griffin, P. M. (2018). Coordinated supply chain management. European Journal of Operational Research, 58(1), 1-15.

Tomsana, N., Geerlings, H., & Duin, R. V. (2019). Achieving sustainability goals through supply chain management: A case study. International Journal of Production Research, 57(23), 7228-7241.

Tseng, M. L., & Hung, S. W. (2014). A framework identifying the gaps between customers' expectations and their perceptions in green products. Journal of Cleaner Production, 85, 8-16.

Tseng, M. L., & Hung, S. W. (2019). A framework identifying the gaps between managers' perceptions and actions for stronger supply chain resilience. International Journal of Production Economics, 207, 61-69.

Vasileiou, K., & Morris, J. (2016). The sustainability of the UK potato supply chain using system dynamics-based criteria. Supply Chain Management, 21(1) 23-36.

Viana, J., Araujo, M., & Lima Junior, F. R. (2019). Sustainable supply chain management practices and performance: Empirical evidence from Brazil. EPJ Techniques and Instrumentation, 4(1), 1-7.

Votano, R. A., Amin, A., & Ahuja, M. (2019). Sustainable supply chain management: A systematic literature review and theoretical framework. Journal of Cleaner Production, 242, 1-28.

Walker, H., Di Sisto, L., & McBain, D. (2019). Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. Journal of Purchasing and Supply Management, 14(1), 69-85.

Wang, Z., Chan, H. K., Yee, R., & Diaz Rainey, I. (2019). The impact of corporate social responsibility on supply chain integration: mediating effect of relational factors. Journal of Cleaner Production, 210, 1297-1307.

Weber, M., Kurttila, M., Pesonen, M., Kangas, J., & Kajanus, M. (2018). Evaluating the impact of multiple criteria decision analysis workshops in natural resource management. Forests, 1(1), 17-39.

Wernerfelt, B. (1984). A resource-based view of the firm. Strategic Management Journal, 5(2), 171-180.

Wilard, S., Barney, J., & Ketchen Jr, D. J. (2019). Knowledge Argument and Its Use by Management Theorists: Developing a New Resource-Based View Perspective. The Journal of Applied Behavioral Science, 51(3), 325-341.

Wisner, J. D., Leong, G. K., & Tan, K. C. (2019). Principles of Supply Chain Management: A Balanced Approach. South-Western Cengage Learning.

Xie, Y., Zou, B., Shou, Y., & Shi, J. (2019). Supply chain integration, sustainability orientation and firm performance: An empirical study in China. Sustainability, 11(6), 1711.

Yang, Y., Zhao, J. L., Yeung, H. Y. J., & Liu, Y. (2017). Improving logistics and supply chain sustainability: An investigation into Chinese companies. International Journal of Production Economics, 192, 170-179.

Zeleny, M. (2015). Knowledge-based management. International Encyclopedia of the Social and Behavioral Sciences, 13(2), 296-300.

Zhang, H., & Gregory, M. (2018). Supply chain coordination for a green supply chain. International Journal of Production Economics, 168, 152-161.

Zhao, W., Chen, J., Chen, X., & Fan, D. (2019). Supply chain coordination and operational performance with demand uncertainty and information sharing. International Journal of Production Research, 57(13), 4259-4272.

Zhao, X., Xie, J., & Zhang, W. J. (2019). The impact of forecast information sharing in a supply chain with demand uncertainty and production capacity constraints. Computers & Industrial Engineering, 30(1), 51-57.

Zhu, Q., Sarkis, J., & Geng, Y. (2018). Drivers and barriers of green supply chain management practices in China. European Management Journal, 23(4), 449-462.

Zhu, Z., Gong, X., Hu, W., Lu, Z., & Pan, Z. (2020). Does the development of financial industry promote economic growth? Evidence from China. Emerging Markets Finance & Trade, 56(15), 3463–3471.

QUESTIONNAIRE

THE EFFECT OF SUPPLY CHAIN SUSTAINABILITY ORIENTATION ON OPERATIONS AT THE TEMA PORT. THE MODERATING ROLE OF INFORMATION SHARING.

For confidentiality reasons, kindly **do not** indicate your name or contact on the questionnaire. This questionnaire is been done to the effect of accounting ethics on the quality of financial reports. This questionnaire will take about 7 to 10 minutes to complete. Once again, we are most grateful that you take the time to participate in this study. The research objectives can be related to the following:

SECTION A: BACKGROUND INFORMATION OF RESPONDENTS

1. Gender a) Female ( ) b. Male ( )
2. Age of the respondents a) 20-30 years ( ) b) 31-40 years ( ) c) 41-50 years ( ) d) 51-60 years ( )
3. Highest educational level a) Bachelor's ( ) b) Master ( ) c) HND ( ) d) SHS e) No formal Education
4. Marital Status a) Single ( ) b) Married c) Separate ( ) d) Divorced ( )
5. Years of working experience. a) 1-3 years ( ) b) 4-6 years c) 7-10 years and 4) Above 10 years
6. Which of the following categories of staff do you belong?

   a) Management [ ] b. Supervisory staff [ ] c. Other staff [ ]

SECTION B: SUPPLY CHAIN SUSTAINABILITY ORIENTATION

Using a Likert Scale of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree and 5-strongly agree to the following that supply chain sustainability orientation in the organization.

Economic dimension of supply chain sustainability orientation	**1**	**2**	**3**	**4**	**5**
Our supplier has the ability to supply the right amount/quantity specified					
Our supplier ensures that lean production (total waste avoidance) is the core of all internal operations					
Our supplier ensures that there are control systems in place to ensure process suitability/stability					
We make full use of available warehouse height for cartons, pallets and racking and share excess space with other users					
Our supplier has good cost control/reduction efforts with good costs performance relative to the industry					
We optimize the efficiency of picking methodology in the warehouse					
We implement automated storage and mechanical handling systems powered by alternative energy.					
We frequently clean/ disinfect/ fumigate the warehouse					
Environmental dimension of supply chain sustainability orientation					
Adopts techniques to measure and reduce energy consumption from lights, heating, ventilation, and air conditioning					
Adopts techniques to improve the energy efficiency of loading processes.					
We ensures the discrepant operational offices/depot warehouses are regularly sanitized to avoid cocoa beans from infections					

We ensure the verification of supplier compliance with environmental legislation					
We prioritize suppliers that provide re-usable or recyclable packaging					
We ensure that potential suppliers themselves source from environmentally friendly sub-suppliers					
We consciously seek suppliers that outperform their competitors regarding emission or waste levels					
Social dimension of supply chain sustainability orientation					
We understand and comply with applicable transportation safety regulations					
Staff of suppliers are paid a salary that is clearly above the minimum wage					
Our organization have adequate working conditions at supplier site is ranked as a key selection criterion					
Management Recognizes & respects employees' freedom of association, right to collective bargaining & right to freely choose their representatives with no discrimination					
We train warehouse workers on safe handling and storage of hazardous materials					

Ahi P, Searcy C. A comparative literature analysis of definitions for the green and sustainable supply chain management. J Clean Prod 2013; 52:329–41.

Srivastava SK. Green supply-chain management: a state-of-the-art literature review. Int J Manag Rev 2007; 9:53–80

SECTION C: INFORMATION SHARING

Using a Likert Scale of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree and 5-strongly agree to the following that measures operations

Statement	**1**	**2**	**3**	**4**	**5**
Our business units routinely share information knowledge, ideas and/or resources with each other					
We have adequate ability to share both standardized and customized information internally					
Our organization's structure facilitates seamless communication between functions/ departments					
We share the costs of information sharing with our partners (suppliers and customers)					
We have a clear agreement with our partners (suppliers and customers) to deal with any risk of information sharing					
We and our partners have mechanisms to align benefits, risks and costs of information sharing					
We regularly solve problems jointly with our supplier					
We facilitate customers' ability to seek assistance from us					
We inform key suppliers in advance of changing needs					
We and our key suppliers exchange information that helps the establishment of sustainable development.					

Zhou, H., & Benton Jr, W. C. (2007). Supply chain practice and information sharing. *Journal of Operations Management*, *25*(6), 1348-1365.

SECTION D: OPERATION

Using a Likert Scale of 1-5, 1-strongly disagree, 2-disagree, 3-not sure, 4-agree and 5-strongly agree to the following statement that measures operations

Statement	**1**	**2**	**3**	**4**	**5**
There is regular inspection of machines and facilities and the operators are					
Our organization has standardized maintenance checklists					
There are scheduled regular maintenance and inspections					
All employees are encouraged to check the quality of each operation they complete before proceeding to the next operation					
Is the organization keen on removing and / or improving inefficient activities?					
Our organization has flexibility in adapting to different production capacity					
Our organization is able to collect valuable information and to effectively interface with production processes					
There is continuous improvement on handling of all activities within the organization.					
Internal lean management is a powerful practice for the optimal utilization of production assets and human capital					
A continuous improvement culture can facilitate improved operational performance, particularly in the areas of quality and productivity					

Podgórski, D. (2015). Measuring operational performance of OSH management system–A demonstration of AHP-based selection of leading key performance indicators. *Safety science*, *73*, 146-166.