

**SUSTAINABLE SUPPLY CHAIN PRACTICES AND
ORGANIZATIONAL PERFORMANCE OF PHARMACEUTICAL
MANUFACTURERS IN NAIROBI COUNTY**

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D67/11043/2018

**A MANAGEMENT RESEARCH PROJECT IS PRESENTED IN PARTIAL
FULFILLMENT FOR AWARD OF THE DEGREE OF MASTER OF SCIENCE IN
SUPPLY CHAIN MANAGEMENT IN SCHOOL OF BUSINESS, UNIVERSITY OF
NAIROBI**

November, 2021

DECLARATION

This research project is my original work and has not been submitted to any other institution or university other than the University of Nairobi.

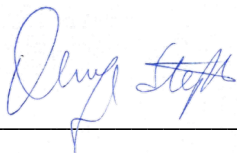
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DEDICATION

This research work is dedicated to close family members and friend who have supported me in the academic journey.

ACKNOWLEDGEMENT

The research project owes its completion to the inspiration, encouragement and support extended to me throughout the writing process.

I extend my gratitude to Dr. Onserio Nyamwange, for guiding me in the entire process of putting together this research work and the support given by my research moderator Dr. Thomas Ombati. Their timely feedback, comments and advices were critical in my breakthrough, which gave me deeper understanding of the research techniques enabling me concluded this toiling academic undertaking.

Finally, and not least I acknowledge my family, friends and colleagues at work, who always spared kind words to encourage me in pursuing my academic engagement. Through your encouragement, I found the drive to push the limitations and deliver this write-up to its end.

TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
ACRONYMS AND ABBREVIATIONS.....	viii
ABSTRACT.....	ix
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the Study.....	1
1.1.1 Sustainable Supply Chain Management Practices.....	2
1.1.2 Organizational Performance.....	3
1.1.3 Pharmaceutical Manufacturers in Nairobi.....	3
1.2 Research Problem.....	4
1.3 Objectives of the Study.....	5
1.3.1 Main Objective.....	5
1.3.2 Specific Objectives.....	5
1.4 Value of the Study.....	6
CHAPTER TWO: LITERATURE REVIEW.....	7
2.1 Introduction.....	7
2.2 Theoretical Review.....	7
2.2.1 Triple Bottom Line Theory.....	7
2.2.2 Sustainability Theory.....	8
2.2.2 The Stakeholder Theory.....	8
2.3.1 Environmental Supply Chain Practices.....	9
2.3.2 Social Supply Chain practices.....	9
2.3.3 Economic Supply Chain practices.....	10
2.4 Organizational Performance Measurement.....	10

2.5 Empirical Review	11
2.6 Conceptual Framework	14
2.7 Summary and Research Gaps.....	14
CHAPTER THREE: RESEARCH METHODOLOGY	16
3.1 Introduction	16
3.2 Research Design	16
3.3 Target Population	16
3.4 Data Collection.....	16
3.5 Reliability	17
3.6 Data analysis	17
CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION	19
4.1 Introduction	19
4.2 Response Rate	19
4.3 Demographic Data.....	20
4.3.1 Distribution of Respondents by Age.	20
4.3.2 Distribution of Respondents by Education Level.....	20
4.3.3 Distribution of Respondents by Department of Work.....	21
4.3.4 Distribution of Respondents by work Experience	21
4.4 Descriptive Statistics for Environmental Sustainable Supply Chain Practices.....	22
4.4.1 Inferential Statistics for Environmental Sustainable Supply Chain Practices	23
4.5 Social Sustainable Practices	24
4.5.1 Inferential Statistics for Environmental Sustainable Supply Chain Practices	25
4.6 Economic Sustainable supply chain practices.....	27
4.6.1 Inferential Statistics for the Economic Sustainable Practices versus Performance	27
4.7 Multivariate Regression Analysis for the Study	29
4.8 Discussion	31

CHAPTER FIVE	33
SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS.....	33
5.1 Introduction	33
5.2 Summary of the Findings	33
5.2.1 Effect of Environmental Sustainable Supply Chain on the Organizational Performance of Pharmaceutical Producers	33
5.2.2 Effect of Social Sustainable Supply Chain Practices on the Organizational Performance for Pharmaceutical Producers	33
5.2.3 Effect of Economic Sustainable Supply Chain Practices on the Organizational Performance for Pharmaceutical Producers	34
5.3 Conclusions	34
5.3.1 Environmental Sustainable Supply Chain Practices and Organizational Performance	34
5.3.2 Social Sustainable Supply Chain Practices and Organizational Performance	35
5.3.3 Economic Sustainable Supply Chain Practices and Organizational Performance	35
5.4 Recommendations	35
5.5 Suggestions for Further Studies	36
REFERENCES.....	37
APPENDIX I: QUESTIONNAIRE	40

ACRONYMS AND ABBREVIATIONS

- APIs** - Active Pharmaceutical Ingredients
- CSR** - Corporate Social Responsibility
- KAM** - Kenya Association of Manufacturers
- KEMSA** - Kenya Medical Supplies Agency
- SSCM** - Sustainable Supply Chain Management

ABSTRACT

This study examined the relation between sustainable supply chain practices on the organization performance of pharmaceutical manufacturers. Academic inquiry on sustainable practices has gained prominence with increased examination on the efficacy and reliability of economic transition into sustainable frontier from the present depletive and destructive industrial activities that are destroying the planet risking the survival of future generations. This study looked into the role of triple bottom line sustainable platform notably; environmental, social and economic sustainability within the pharmaceutical supply chain. The study sought to determine whether, environmental sustainable, social sustainable and economic sustainable supply chain practices have an impact on the organizational performance of pharmaceutical manufacturers. The study employed descriptive survey methodology with the target population composed of pharmaceutical manufacturing firms in Nairobi. The study utilized census sampling technique, drawn by the fact that only 40 firms are fully certified in undertaking production and distribution of pharmaceutical products in Nairobi region. A structured questionnaire, with a 5-point scale, was utilized as the tool for data collection. The tool was designed with a leading set of questionnaire items covering the three sections of triple bottom sustainability approach which are; environmental, social and economic sustainability. For each of the 40 pharmaceutical companies, a participant was selected for study drawn from a senior management position. The study established that triple bottom line sustainability factors including environmental, social and economic sustainable supply chain practices impacted on the organization performance of pharmaceutical manufacturers. Environmental sustainable practices accounted for variability and change on organization performance ($R^2 = 0.301$, $\beta_1 = 0.730$) which is an incremental parallel outcome. Similarly, social sustainable supply chain practices were found to account for changes ($R^2 = 0.431$, $\beta_2 = 0.948$) in organization performance output. Finally, the economic sustainable practices were found to account for variability and changes ($R^2 = 0.711$, $\beta_3 = 1.074$) on the organizational performance. The study concludes that triple bottom line factors for sustainability notably, environmental sustainable supply chain practices, social sustainable supply chain practices and economic sustainable supply chain practices account for significant quantitative changes in organization performance for pharmaceutical producers. The study recommends for increased investments in high-tech infrastructure across the entire supply chain of pharmaceutical sector. Such technology should be tailored to offer sustainable operational solutions notably; eliminate exhaust pollution, ensure carbon emission control, integrated closed loop system and expanded compatibility to diverse clean energy sources. The study proposes for introduction of incentives through government policy to boost adoption of clean and renewable sources for energy. Additionally, the study recommends enhanced corporate efforts towards coal causes that uplift the society such as enlightenment of public hygiene, environmental conservation and expanded access to life-saving medicines.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Sustainable SC practices within the pharmaceutical industry has attracted significant attention amongst SC chain scholars (Kumar et al., 2019;Sazvar et al., 2021;Toh & Chew,2017;Zandieh et al.,2018) from across the globe. Pharmaceutical sector is one of the largest and most critical industries of the world (Narayana, Pati & Vrat, 2012). Disposal phase in pharmaceutical SC, is ranked as the most delicate and dangerous processes as it involves destroying and dumping medical chemical waste whose input materials include dangerous chemicals that can be harmful to the society. Sustainable practices within pharmaceutical industry address solutions to medical waste disposal, manufacturing efficiency, medical products reverse logistics, affordability of critical life saving medicines and re-usability of pharmaceutical inputs for medicine production (Toh & Chew, 2017).

Advances in technologies and material sciences has boosted the global scaling of sustainable measures within pharmaceutical sector with adoption of reverse logistics and end-of-life recycling boosting operational efficiencies (Zhi-Dong et al., 2011).Furthermore, advances in clean energy production, has enabled pharmaceutical producers integrate green energy sources which boosts environmental sustainability and economic sustainability through new jobs in green technologies (Bhusnure *et al.*, 2015). Similarly, increased corporate social responsibility (CSR) initiative by pharmaceutical companies in areas such as price differentials for pharmaceutical products, assisting in infrastructure development for drug distribution in developing countries, contributing in public health awareness campaigns etc.(Droppert & Bennett, 2015). Evidence cited on progress of sustainability programs in pharmaceutical sector highlights the existing potential of sustainable practices value within the purview of social, environmental and economic fronts towards a greener future.

Theories notably; Triple Bottom line theory, sustainability theory, and stakeholder theory were adopted. Three theories including; triple bottom line theory, sustainability theory and stakeholder theory were adopted in this study. Triple bottom line advances the need of corporate business to expand its focus beyond singular bottom line (profits) to include, people (social) and the planet (environmental) impact which make up three Ps of bottom line (Henry, Buyl & Jansen, 2019).

The sustainability model aligns the role of three factors, including; environmental, social and economic consciousness as a corporate duty of modern business (Harrington, 2016; James, 2014). The sustainability theory thus explains the role of pharmaceutical industry players in undertaking their obligations in the purview of social, environmental and economic sustainability. The stakeholder theory offers a link between organizations and their stakeholder (both internal & external). The Stakeholder theory posits on the duty of business sector towards demonstrating care for all communities, people, entities and organizations that are impacted by their operations (Freudenreich *et al.*, 2020). Therefore, the stakeholder theory details the obligations corporations have in attending to the interests of all their stakeholders.

1.1.1 Sustainable Supply Chain Management Practices

Three spheres of sustainable supply chain notably; environmental supply chain sustainability, social supply chain sustainability and economical sustainable supply chain sustainability, defines the framework for sustainable pharmaceutical supply chain. Submissions by (Milanesi, Runfola & Guercini, 2020; Zhi-Dong et al., 2011) pins environmental sustainability scope of pharmaceutical supply in utilization of techniques such as; reverse logistics, recycling of production inputs, diversification of sources for raw materials, cutting of carbon emission in drugs manufacturing, utilizing green packaging in transportation etc. Kumar et al. (2019) acknowledged initiatives smart waste management for healthcare facilities as positive contribution towards environmental sustainability.

Social sustainable pharmaceutical supply chain encompasses integration of SC operational measures that enables pharmaceutical players to compensate the social welfare of external stakeholders in regard to operations of pharmaceutical companies (Droppert & Bennett, 2015). Undertaking measures such as upgrade to the drug distribution infrastructure in developing countries boosts poor communities access to critical medicines such as; medication for lifestyle diseases (Rocha et al., 2020). According to (Droppert & Bennett, 2015) also pharmaceutical companies investing in downstream distribution of medicines contributes in reducing drug prices thus boosting access to life-saving drugs for the poor communities.

Economic sustainable pharmaceutical supply chain anchors the pharmaceutical corporations into adopting economic solutions aligned with green manufacturing techniques. According to (Bhusnure et al. 2015; Milanesi et al. 2020) creating new jobs in clean energy production within

pharmaceutical ecosystem forms an important step towards integrating sustainability techniques towards pharmaceutical industrial processes. In addition, economic sustainable pharmaceutical SC should be defined by commitment of medicine distributors and manufacturers towards embracing fair working practices and pay equal share of taxes to the government on a periodic basis (Droppert & Bennett, 2015).

1.1.2 Organizational Performance

Several factors affect the organization performance of pharmaceutical companies across the world. Information gleaned from several types of research indicates that environmental factors as well company-specific variables contribute immensely towards the performance of the organization in the market. The environmental factors that affect the performance of pharmaceutical firms in the market include competition and market-related changes for example expiry of patents or drug withdrawal from the market (Chemutai and Nzulwa, 2016). The company-related factors include the company structure, marketing strategies, human resources, financial resources, and product quality factors (Mailu et al. 2018). Financial, managerial, and product variables anchor the key performance measures of organizational performance. The financial related performance indicators consist of profitability, cost of production, and availability of funds for expansion (Srimarut and Mekhum, 2020; Mahmoodabadi et al., 2019).

1.1.3 Pharmaceutical Manufacturers in Nairobi

The Kenyan pharmaceutical industry consists of drug manufacturers that sell their products directly to the market through chemists or to the public hospitals through Kenya Medical Supply Agency (Simonetti, 2016). Organizations like the mission for essential drug supply (MEDS) sell pharmaceutical products to faith based health facilities. There are 39 pharmaceutical manufacturing companies mostly located in Nairobi, Kenya (Simoneti 2016, PATH, 2015). Concerning the pharmaceutical manufacturing companies, Simonetti et al. (2016) observed that out of the 39 pharmaceutical manufacturing entities in Kenya, 34 manufacture drugs for human consumption while the remaining manufacture both drugs for human and animal use. The players in the Kenyan pharmaceutical industry include local firms and multinationals.

1.2 Research Problem

Several studies indicate that sustainability measures that an organization incorporates into its operations affect the overall organizational performance. Analysis by Islam et al. (2017) established that sustainability contributed toward organizational performance by improving the competitive advantage of a firm. Further studies have shown that sustainability boosts the economic aspects of performance, which include production and the cost of production thus contributing towards organizational performance (Medne and Lapina, 2019; Srimarut and Mekhum, 2020).

Chemical used in the manufacturing of drugs being harmful to the environment. Pharmaceutical manufacturing process involves wide variety of bio-chemical inputs sources from many places globally (Aus der Beek et al., 2016). Larsson (2014) detailed array of toxic effluents in pharmaceutical industries including the Active Pharmaceutical ingredients (API's) such as the estrogens in pharmaceutical effluent which destroyed marine life in the 90's. Equally, pharmaceutical supply chain contributes massive levels of greenhouse emissions that compromise the atmosphere negatively contributing to global warming (Aus der Beek et al., 2016). This history of environmental degradation attributed to pharmaceutical manufacturing highlights the urgency towards integration of sustainability strategy which addresses environmental, social and economic obligation by pharmaceutical firms.

Increased focus on sustainability is hinged on the need to reverse dangers posed by industrial operations such as pollution which has contributed to global warming and desire to preserve existing natural resources for future generations. Sustainability literature is anchored on three fundamental pillars that include; environmental sustainability, social sustainability and economic sustainability (Korir, 2014; Mani, Agrawal & Sharma, 2015). Environmental, social and economic pillars on sustainability are applicative across diverse fields in all manufacturing and service sectors. However, the aspect of these practices and the impact on the performance of pharmaceutical manufacturing companies is less studied, hence the motivation for the current study pharmaceutical manufacturing companies in the country.

An array of past studies on sustainability has attracted examination on different elements of sustainable practices in operational, service and industrial activities. A study by de Campos et al. (2017) analyzed reverse logistics for pharmaceutical products that have reached the end of use

state. A study by Nyatondo (2019) explored on the subject of the green supply chain for the milk industrial processing in Zimbabwe. Additionally, a study conducted by Srimarut and Mekhum, (2020) using questionnaire survey approach established that SSCM practices employed by Thailand pharmaceutical companies boosted improved the productivity and the cost of production by the drug manufacturing firms.

Besides, a study by Murage (2011) performed an industry analysis centering on green supply chain practices and the performance of manufacturing companies in Kenya. The study employed descriptive research approach with participants drawn from the Kenya Association of Manufacturers (KAM). The study revealed underlying gains for manufacturers in areas such as cost-cutting and enhanced operational and production efficiencies.

From the aforementioned studies, its evident sustainability practices have attracted academic inquiry across various industries from around the globe to the local context. However, the past analysis focused on a diverse set of industries from manufacturing to service sectors. The studies examined sustainability in a shell and how it's adopted in a practical production context. The area of sustainable supply chain practices in the performance of pharmaceutical manufacturers has not been extensively examined. This has a present knowledge gap that the current study will seek to close. The key research questions include: What are the sustainable supply chain practices adopted by pharmaceutical manufacturers in Nairobi County? How do sustainable supply chain practices adopted by pharmaceutical manufacturers affect organizational performance?

1.3 Objectives of the Study

1.3.1 Main Objective

The main objective of this study is to determine the effect of sustainable supply chain management practices on the organizational performance of pharmaceutical manufacturers in Nairobi.

1.3.2 Specific Objectives

- i) To determine the effect of environmental sustainable supply chain practices on the organizational performance of pharmaceutical manufacturers in Nairobi County.

- ii) To examine the influence of social sustainable supply chain practices on the organizational performance of pharmaceutical manufacturers in Nairobi County.
- iii) To evaluate the effect of economic sustainable supply chain practices on the organizational performance of pharmaceutical manufacturers in Nairobi County.

1.4 Value of the Study

The study explored on all the factors relating to sustainable supply chain practices; environmental sustainable management, social sustainable management and economic sustainable management and the effect they wield on the operational performance of pharmaceutical manufacturers. The study has identified and proposed strategies for adopting and implementing sustainable supply chain practices within operational framework for pharmaceutical manufacturing processes. This shall have long term benefits towards aligning operational framework for pharmaceutical manufacturers with sustainability goals contributing in greener and efficient production processes.

The findings of this offer recommendations on policy and regulatory dimensions of sustainability platform. This is valuable to policy formulators and legislators in government towards development of policies, operational procedures and laws on the adoption of sustainable supply chain practices within the pharmaceutical supply chain. This is critical towards creating legal and regulatory framework in regard to sustainable practices among pharmaceutical manufacturers thus aid in the realization of national goals on sustainability.

The findings of the current study have significant value for the academia. The subject of sustainability in general is gaining momentum across the academic spectrum. The current study has submitted additional knowledge in literature on the role of sustainability within the purview of pharmaceutical supply chain. More evidence on sustainable supply chain practices shall present future researchers and scholars on sustainability with additional sources for literature and referencing while carrying out their own studies on sustainability practices.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews past works on sustainable supply chain practices. The chapter will also explain the dimensions of the sustainable supply chain including the environment which includes social, economic, and environmental pillars of supply chain sustainability. Additionally, the section will review sustainability theory along with the stakeholder theory as they form the basis for the study.

2.2 Theoretical Review

2.2.1 Triple Bottom Line Theory

The triple bottom line theory is credited to the works of John Elkington in 1994 in measuring the performance of corporate firms (Alzoubi et al., 2020; Miemczyk & Luzzini, 2019). In corporate scene the premium value of operational success is evaluated based on the bottom line which is the weight of the profit margins. In light of emerging trends of community and environment commitment by business organizations, the concept of triple bottom line offers an expanded definition of corporate performance. According to perspectives of John Elkington measure of corporate performance should, the overall business value should be anchored on three pillars of profit, people and planet (Alhaddi, 2015; Neri et al., 2021). Henry et al. (2019) posit that corporate organizations record on attending to issues of humanity through corporate social responsibility, and care for environment should be on similar intensity with efforts committed towards generating profits.

This study seeks to gain an insight on the role pharmaceutical companies in embracing and integrating sustainable practices within their supply chain spectrum. The triple bottom line theory sufficiently underpins the roles of pharmaceutical manufacturers towards adopting social, environmental and economical sustainable practices in their operations. According to Milanese, Runfola and Guercini (2020) pharmaceutical supply chain forms a critical spectrum of global value with far reaching environmental and social impacts. This highlights the importance of integrating triple bottom line approach for the pharmaceutical players in facilitating their operations aligned with concerns for people and the environment in similar breadth with the drive for profits.

2.2.2 Sustainability Theory

Sustainability theory captures the conflict between several interest groups on what to sustain between social, economic, and environmental issues. This arises since different factions tend to define sustainability differently (Harrington, 2016). The sustainability model seeks to grant precedence to social problems in society and combine its responses to environmental as well as cultural issues. Several groups contribute to sustainable theory. The factions include political, economic, and ecology which proposes their models towards dealing with sustainability issues in the world. The economic model of sustainability theory is concerned with the sustainability of financial capital along with natural capital.

This group holds the view that financial capital is the key to solving ecological and social issues in the society hence should be given priority. According to Shi *et al.* (2019) focusing on economic sustainability posed serious problems to environmental sustainability which is the opposite of what it was expected to accomplish. Lastly, the ecological view of sustainability theory argues that the preservation of natural capital should be prioritized over economic or cultural issues. Harrington (2016) observed that the preservation of natural capital is a stronger approach to sustainability. This is attributable to the concept that natural capital is irreplaceable even by financial capital.

2.2.2 The Stakeholder Theory

The stakeholder theory was proposed in 1984 by Edward R Freeman. The stakeholder model is based on two core principles touching on creating value and establishing meaningful relationships with stakeholders. The stakeholder model argues that an organization must strive to develop relationships with its stakeholders besides providing value to the stakeholders (Freeman & Dmytriiev, 2017). According to the model, the stakeholders of an organization comprises of its customers, employees, shareholders, suppliers, community, government as well as trade unions, and the media. The stakeholders interact with the organization frequently and are termed as interested parties in the firm. In this respect, the organization gains more value by operating as part of the society rather than operating as a separate entity. Valentinov, Roth, Will (2018) noted that the stakeholders have a share of the organization's failures and success. Therefore the organization has obligations to all of its stakeholders. The stakeholder theory helps the leaders and managers of an organization to understand the connection between the organization and the stakeholders as

well as gauge how the relationship affects the performance of the organization (Jones, Harrison, & Fleps, 2018).

2.3 Dimensions of Sustainable Supply Chain Practices

The pillars of sustainable supply chain practices include economic, environmental, and social factors (Alzoubi et al., 2020).

2.3.1 Environmental Supply Chain Practices

Scholars and supply chain practitioners tout sustainable supply chain practices as the solution for eliminating environmental pollution emanating from supply and manufacturing processes. According to Islam et al. (2018) environmental supply chain practices stress on practices like recycling to reduce the amount of wastes and the need for continuous sourcing of raw material for making components. On the other hand, Cankaya and Sezen (2018) noted that manufacturers should identify the source of pollution in their supply chain process and work on eliminating the same to reduce pollution. Therefore, pollution elimination remain the key objective of sustainability due to its positive impact on the environment.

The transport component of the supply chain contributes 88% of the carbon emission in the environment (Ahmed and Sarkar, 2018). Evidence exist that different manufacturing activities contribute differently toward the carbon footprint that an organization leaves in the environment (Bouchery et al. 2017). The finding indicates that without appropriate measures of sustainability, supply chain could harm the environment. Scholars argue that instituting carbon tax and assigning each organization, a tax cost equivalent to their contribution of carbon emissions considerably reduces carbon emissions due to supply chain (Ahmed and Sarkar, 2018). Additionally, Liu et al (2018) noted carbon tax regulation through taxes and legislation help manufacturers to ensure that their manufacturing processes are sustainable.

2.3.2 Social Supply Chain practices

Corporate social responsibility is a popular practice among organizations to boost the image of the firm before the public. Coupled with sustainable supply chain, CSR enables an organization to gain an upper hand against the competition. According to Schinckus et al. (2019) CSR is designed to improve the profitability of the firm thus justifying the need to increase the budgetary allocation for the activity. On the other hand, Liu et al. (2018) pointed out promoting the sustainable development of the

society is the most urgent need that must be undertaken by managers. In this regard, there are justifiable reasons for increasing the CSR budget to promote socially sustainable activities.

Corporate social responsibility fulfills several functions in an organization. Liu et al (2018) argue that firms should use CSR to highlight the social issues in the society for instance environmental degradation, product safety, or even addressing labor concerns. On the other hand, Schinckus et al (2019) noted that expanding the CSR programs enables the organization to tackle social issues that exist in the society and helps project the image of the firm positively. As part of social sustainable practices, charity events serve several purposes in an organization's CSR initiatives. According to Batty et al. (2016), charity events include engaging in fundraising programs, environmental conservation programs, donations, as well as conducting sponsorships.

2.3.3 Economic Supply Chain practices

Reverse logistics is gaining ground as an economic sustainable supply practice. This is because, reverse logistics contribute significantly to cost cutting. According to Hsu et al. (2016), reverse logistics entails collecting used products and or packaging from the market to the suppliers to enable recycling or reuse. The practice enables an organization to cut down on supply and production costs. Conversely, some scholar scholars argue that reverse logistics could be an expensive venture. For instance, Misni and lee (2017) pointed out that reverse logistics may require firms to design new routes, relocate company premises, as well as improving their existing production line to include ability to recycle.

Clean energy not only promotes environmental conservation but also may be cheap to firms that use it for manufacturing purposes. Manufacturing firms across the world are increasingly taking up the green energy challenge by using the green energy a preferred energy source for running their operations. According to Marchi and Sanoni (2017), using clean energy is cheaper to the organization in the end as they cut costs associated with carbon related emissions that an organization has to bear. Additionally, clean energy sources lead to cleaner production related activities.

2.4 Organizational Performance Measurement

According tom Olaninyi (2018) operational efficiency is the capacity of the firm to reduce costs and maximize resources to increase the production of goods and services. Factors such as human resources, technological advancements, and supply chain affect the operational efficiency of

affirm. Therefore, an organization cannot declare profits in its operational efficiency are unsatisfactory. Ndolo (2015) noted that the operational efficiency of an organizations contribute majorly to the solvency index of the organization. Olaninyi (2018) also note that improving the operational efficiency of an organization is costly to the dynamic business environment. According to Tosun and Uyal (2016), distribution flexibility is the ability of the organization to alter its transportation and logistical abilities to meet the customer demands. Changes in distribution require the organization to align its information and material flow to the company's supply chain.

2.5 Empirical Review

Pharmaceutical firms appear to adopt green supply practices only when under pressure from the industry regulators, governments, and consumers. Several studies allude to this fact. For instance, a study by Dhull and Narwal (2016) carried out a literature review study of the Indian Pharmaceutical industry and observed that most pharmaceutical firms in India do not follow green supply chain principles thus endangering the environment. The findings of the study, though significant, relied on secondary data. There is a need therefore for a more comprehensive study that will take into consideration the primary data that will capture the current information on the study problem. A survey of manufacturing firms, including pharmaceutical firms, in Pakistan by Seed at al., (2018) finds out that manufacturing firms do not adhere to the philosophy of sustainable business practices unless when pressure is applied to them by the regulatory bodies. Other studies indicate that Indian firms are beginning to factor in sustainable supply chain practices into their operations due to government pressure (Kurian, 2018). The scholar further established that pharmaceutical firms that incorporated sustainable supply chain practices improved their performance by reducing business costs.

Studies indicate that pharmaceutical companies rarely institute SSSC practices unless when they are motivated by pressure from regulators and other stakeholders. However, firms that practice SSSC perform better in the market. A study by Mani et al., (2016b) established that some pharmaceuticals companies have taken steps to better their relationships with the communities by meeting some of their social needs through charities. In return, the firms realize that they have developed brand identities that give them a competitive edge in the market. Additionally, studies established that firms that implement SSSC have socially acceptable products in the market

(Padhia, Pati, & Rajiv, 2018). This grants the organization a competitive advantage in the market compared to other firms with a poor relationship with the social stakeholders (Odipo and Njeru, 2016).

A study by Vidal et al., (2018) established the need to institute advanced socially sustainable supply chain practices in the manufacturing industry since the basic measures introduced by firms do not work and have no benefits to the social stakeholders of most organizations. Furthermore, an investigation by Mani et al (2016) determined that some attributes of socially sound sustainable habits are easily adopted by organizations while others are neglected. The selective adoptions of SSSC practices mean that organizations are unable to fully meet their social objectives.

A study conducted in Germany by Ullwer, Campos, and Straube (2016) noted that firms with the reverse flow of materials from the consumers to the firm were economically strong since they did not incur excessive costs in sourcing new materials from the suppliers. These firms used strategies like recycle and reuse to strengthen its manufacturing operations. A study targeting the Kenyan pharmaceutical companies observed that firms in the pharmaceutical industry have to balance several supply chain models to avoid holding too much inventory which is costly and risky to the environment (Bett, 2018). Another study carried in Kenya Medical Supply Authority established that the firm has no suitable infrastructure for an economically sustainable supply chain (Musalia, 2018). This indicates that local firms have poor supply chain strategies that are not economical.

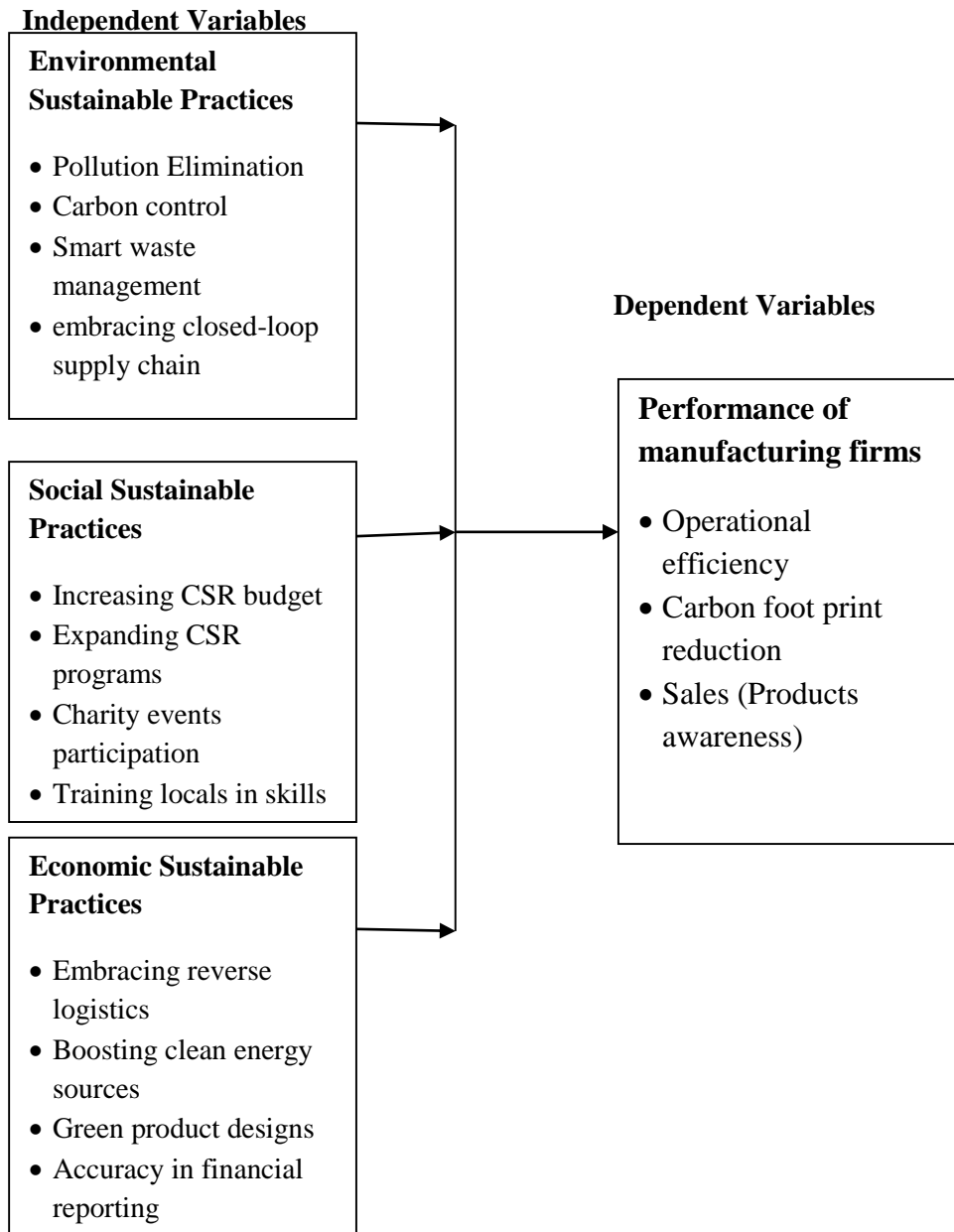
Regionally, a study conducted in South Africa, established that uptake of environmentally supply chain practices lead to better performance in an organization and reduced the environmental footprint of pharmaceutical firms. However, the study established that there is still a big challenge in the employment to green supply chain practice due to poor adoption of government policy, cost implications, and poor grasp of environmental sustainability issues among the employees (Reddy, 2016).

In Kenya, studies suggest that incorporating supply chain practices in the health care supply chain returns significant benefits to the environment as well as the company. Mbaabu (2016) established that the uptake of environmentally sustainable supply chain practices is still below average despite the pressure from the stakeholders. Firms should strive to make socially acceptable products with the smallest impact on the environments as a contribution to their SSSC practices (Musalia, 2018).

Further to this, firms should strike a balance between people, profit, and environmental preservation for better performance. Studies reveal that firms could use corporate social responsibility (CSR) strategy to boost their social standing in the market. Studies by Odipo and Njeru (2016) argue that pharmaceutical firms using CSR to further their relationship with consumers in Kenya find that their goods and services are competitive in the market and by extension they can realize better stock prices at the Nairobi Securities Exchange. Johari and Hosseini-Motlagh (2020) noted that pharmaceutical firms that use CSR can elevate customer loyalty and serve the interest of the environment. This indicates that firms that are incorporate SSSC practices into their operation benefit in the long run.

2.6 Conceptual Framework

Figure 2.0 Conceptual Framework



2.7 Summary and Research Gaps

In summation, the articles reviewed in the section indicate that firms should be socially responsible for it to enjoy more profitable opportunities in the market. This will enable the pharmaceutical firms to provide value to its stakeholders. This is in line with the explanations provided by the

stakeholder theory that organizations should provide value for its stakeholder. However, the studies reviewed in the section are inconclusive thus requiring the need for a current study that investigates the SSSC practices in pharmaceutical firms in Kenya.

Gaps in practice are captured in the followed literature; The Study by Mbaabu (2016) examined sustainable supply chain in healthcare provision. Vidal et al., (2018) study examined the overall role of sustainable supply chain within the scope of general manufacturing industry. A study by Odipo and Njeru (2016) focused on the aspect of CSR within the purview of consumers in Kenya. Musalia (2018) examined the adoption of sustainable practices within the medical services supply chain. Gaps in context are presented in the following set of past studies; Literature by Dhull and Narwal (2016), Kapoor (2018), Padhia, et al. (2018) were centered in Indian supply chain practices. Seed at al., (2018) study focused on sustainable model in consideration to Pakistan supply chain. Reddy (2016) examined green supply chain practices in South Africa

In addition, economically viable supply chain practices are well-practiced in developed nations of the world. However, in the local setting, pharmaceutical firms have not yet fully established economically sustainable supply chains..

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section covers critical elements on research methodology.

3.2 Research Design

Descriptive design was appropriate adopted in this research work. This study employed cross-sectional philosophy with the scope focused on all pharmaceutical manufacturers across Nairobi region. Cross-sectional technique was preferred as it enables the study integrate contributions of all presently operating pharmaceutical manufacturers without utilizing any clustering or categorization. Furthermore, cross-sectional study offered insights on the existing understanding and the level sustainability within the pharmaceutical supply-chain. The study covered the three pillars of sustainable supply chain practices which include; environmental sustainability practices, social sustainability practices and economic sustainability practices.

3.3 Target Population

This study targeted 40 registered pharmaceutical manufacturers in Nairobi. The Study targets to use census study considering the target population is small. The list of all pharmaceutical manufacturers operating in Nairobi region was obtained in the published directory of Kenya Pharmaceutical Technologies of 2021 (Kenyapharmtech, 2021). Unit of observation were the 40 pharmaceutical manufacturers, whereas the unit of analysis was composed of senior manager from the pharmaceutical firms drawn from either of the following departments; logistics and supply chain, production, corporate affairs and research and development. Choice and inclusion of this group, was informed by the desire to gain insight on the perspective of different policy level managers with the pharmaceutical sector on their views on viability of sustainable supply chain practices on organizational performance.

3.4 Data Collection

The 5-point scale in the questionnaire was used to gather data, where value 1 will be granted the least level of satisfaction and 5 the highest level of satisfaction. The ordinal format enables the study to gauge the level of agreement amongst the respondents for each of the questionnaire statements hence enabling the determination of understanding on acceptance of sustainable supply chain practices within the Kenyan pharmaceutical manufacturing.

The researcher sought for an official consent to undertake the field survey exercise from the university. The consent was confirmed in the letter from the university which in-turn authorized the sending of invitations to the selected participants to assist in offering feedback during the process of data collection. The letter highlighted all information with regard to the field survey exercise. The researcher also applied for the NACOSTI field research license, which confers approval for the researcher to conduct a field survey in accordance to standard regulations guiding academic field surveys in Kenya. The respondents were senior managers within the pharmaceutical manufacturing companies operating in Nairobi.

The researcher made prior communication to all the identified respondents requesting for their participation in the study and informing them of the modalities of the delivery of the questionnaires and subsequently collection process from them upon completion of the field survey.

3.5 Reliability

The construct validity is critical in assessing whether tools measure what it's actually supposed to measure (Cooper & Schindler, 2014). The constructs that were covered in the study were obtained from sustainability literature within the scope of sustainable supply chain practices, notably; environmental sustainability practices, social sustainability practices and economic sustainability practices.

Construct validity sought to certify the contents of questionnaire as to whether they address the indicators being measured. The questionnaire development utilized knowledge gathered on sustainable supply chain practices.. All the items in each variable evaluated components of sustainable supply chain practices; environmental sustainability, social sustainability and economic sustainability on performance of pharmaceutical manufacturers in Nairobi County.

3.6 Data analysis

The study employed descriptive analytical technique while analyzing the data on sustainable supply chain practices; environmental sustainability, social sustainability and economic sustainability on organization performance of pharmaceutical manufacturers in Nairobi County. Upon conclusion of the field survey, all the questionnaires were inspected; the data cleaned was then cleaned using excel software..

For inferential statistics, the study employed linear regression test, pitting predictor variables including environmental sustainability practices, social sustainability practices and economic sustainability practices against the dependent variable performance pharmaceutical manufacturers in Nairobi County.

The regression equation for the study will be; $Y = \beta_0X_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \acute{E}$

Where;

Y= organizational performance of pharmaceutical manufacturers

β_0X_0 = constant

$\beta_{1,2,3}$ = beta coefficients for environmental, social and economic sustainability variables

X_1 = environmental supply chain practices

X_2 = social supply chain practices

X_3 = economic supply chain practices

\acute{E} = error term

3.6 Operational Definition of Terms

Objective	Variable	Indicator	Measurement	Tool of Analysis
	Independent			
Environmental sustainable processes on the organizational performance of pharmaceutical manufacturers in Nairobi.	Environmental Sustainable Processes	Pollution elimination	Likert /Ordinal	Frequency and Mean Tables
		Carbon control	Likert /Ordinal	Frequency and Mean Tables
		Smart waste management	Likert /Ordinal	Frequency and Mean Tables
		Embracing closed-loop supply chain	Likert /Ordinal	Frequency and Mean Tables
Social sustainable practices on the organizational performance of	Social sustainable practices	Increasing CSR budget	Likert /Ordinal	Frequency and Mean Tables

pharmaceutical manufacturers in Nairobi.		Expanding CSR programs	Likert /Ordinal	Frequency and Mean Tables
		Charity events participation	Likert /Ordinal	Frequency and Mean Tables
		Training locals on skills	Likert /Ordinal	Frequency and Mean Tables
Economical sustainable practices on the organizational performance of pharmaceutical manufacturers in Nairobi.	Economical sustainable practices	Embracing reverse logistics	Likert /Ordinal	Frequency and Mean Tables
		Boosting clean energy sources	Likert /Ordinal	Frequency and Mean Tables
		Green product design	Likert /Ordinal	Frequency and Mean Tables
		Accuracy in financial reporting	Likert /Ordinal	Frequency and Mean Tables
	Dependent			
To determine the effect of sustainable practices on the on the organizational performance of pharmaceutical manufacturers in Nairobi.	Organizational performance of pharmaceutical manufacturing	Operational efficiency	Likert /Ordinal	Frequency and Mean Tables
		Carbon footprint	Likert /Ordinal	Frequency and Mean Tables
		Sales (increased awareness)	Likert /Ordinal	Frequency and Mean Tables

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This section covers the discussions on the research findings

4.2 Response Rate

The study was comprised of pharmaceutical Manufacturers operating within the sphere of Nairobi metropolitan region. Records gathered in the study established that 40 pharmaceutical manufacturing companies operated within Nairobi region, thus informing the application of census technique in data collection. The target population for study was senior managers from the 40 companies, one per company drawn from either of the following departments; logistics and supply chain, production, corporate affairs and research and development. Therefore, 40 questionnaires

were dispatched to the 40 companies for participation in the study. A single participant from each of the companies drawn from various departments including; Logistics & Supply Chain, Production, Corporate Affairs and, Research and Development were presented with the task of responding to the questionnaires. This diversity in participants was informed by the desire to gauge collective direction amongst managers in pharmaceutical companies with regard to sustainable supply chain practices within pharmaceutical sector. All the 40 questionnaires, representing 100% response rate, were returned in time for data analysis. This success was attributed to research concerted efforts at closely following up via phone calls and messages to the participants and encouraging them to participate in the study.

4.3 Demographic Data

The demographic background information for the respondents captured; age, education, business function and work experience.

4.3.1 Distribution of Respondents by Age.

Table 4.1 Age Distribution

Age category	Frequency	Percent
18 - 30 years	2	5.0 %
31 - 35 years	4	10.0%
36 - 40 years	10	25.0%
41 - 45 years	17	42.5%
Over 46 years	7	17.5%
Total	40	100.0%

The results imply that there exists diversity in age distribution within pharmaceutical sector manufacturing, with high concentration of middle aged professionals. This age group is also well conversant with matters of sustainability practices in operational scope for a better future in pharmaceutical manufacturing system.

4.3.2 Distribution of Respondents by Education Level

Table 4.2 Distribution of Respondents by Education Level

Category	Frequency	Percent
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Diploma	4	10.0 %
Undergraduate Degree	20	50.0%
Post-graduate Degree	16	40.0%
Total	40	100.0%

In addition, the results imply that, academic attainment factor is a critical factor for consideration before the rolling out of sustainable supply chain practices.

4.3.3 Distribution of Respondents by Department of Work

Table 4.3 Distribution of Respondents by Department of Work

Category of work occupation	Frequency	Percent
Logistics and supply chain	13	32.5%
Production	11	27.5%
Corporate affairs	11	27.5%
Research and Development	5	12.5%
Total	40	100.0%

13 (32.5%) indicated to be attached to the logistics and supply chain division. Further, 11(27.5%), of the respondents indicated to work in the production department. Similarly,11(27.5%), of the respondents indicated to work within the corporate affairs department. Finally, 5(12.5%) of the respondents indicated to work in the research and development division. The results show a diverse set of experts within the senior management of pharmaceutical manufacturers. This imply that, contributions diverse expertise in production technical frontier, supply chain management, corporate affairs and research are needed to be well aligned with company objectives for integrating sustainable supply chain practices.

4.3.4 Distribution of Respondents by work Experience

Table 4.4 Work Experience

Category	Frequency	Percent
Below 5 years	4	10.0%

6 - 10 years	9	22.5%
11 - 15 years	13	32.5%
16 - 20 years	10	25.0%
Over 20 years	4	10.0%
Total	40	100.0%

This implies that experience in pharmaceutical manufacturing sector wields a significant influence on the changes towards integration of sustainable supply chain programs for the pharmaceutical production system.

4.4 Descriptive Statistics for Environmental Sustainable Supply Chain Practices

table 4.5 presents descriptive output of the findings aggregated in means and standard deviation.

Table 4.5 Mean & Standard Deviation for Environmental Sustainability

Factors for environmental sustainable practices	N	Mean	Std. Deviation
Employing green operational strategy boosts the efficiency on operational execution for pharmaceutical producers.	40	4.50	.784
Employing emission reduction exhaust systems in transportation systems and production plants reduces pollution attributed to pharmaceutical manufacturers	40	4.15	.700
Embracing modern technologies for carbon emission controls in pharmaceutical production plants boosts operational efficiency.	40	4.40	.632
Diversification of sources for raw materials used in pharmaceutical production prevents overreliance of existing sources boosting long-term smart productivity.	40	4.35	.533
Embracing clean energy sources in production lines will boost operational effectiveness and limit environmental damage due to energy utilization	40	4.02	.920
Building capacity for logistics and production staff in relation to operational practices will enhance operational efficiency and limit environmental damage attributed to pharmaceutical production operations.	40	4.20	.823
Embracing reverse logistics strategy for product movement eliminates wastages and pollution thus boosting operational efficiency.	40	4.30	.608

Investing on pharmaceutical production and logistics infrastructure that is environmentally sustainable compliant boosts operational efficiency.	40	4.30	.791
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The results show that, the respondents supported that embracing reverse logistics strategy for product movement eliminates wastages and pollution thus boosting operational efficiency (mean = 4.30, standard deviation= 0.608).

4.4.1 Inferential Statistics for Environmental Sustainable Supply Chain Practices

The study performance inferential test which was implemented using linear regression test between independent variable environmental sustainable supply chain practices versus organizational performance of pharmaceutical manufacturers.

Table 4.6 Model Summary for Environmental Sustainable Practices versus Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.549 ^a	.301	.283	.55709
a. Predictors: (Constant), Environmental sustainable practices				

The results also imply that environmental sustainable supply chain practices account for 30.1% in variability of organization performance of pharmaceutical manufacturers with 69.9% of variability attributed to factors external to environmental sustainable practices.

Table 4.7 ANOVA for Environmental Sustainable Practices versus Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.089	1	5.089	16.399	.000 ^b
	Residual	11.793	38	.310		
	Total	16.883	39			
a. Dependent Variable: Organizational performance						
b. Predictors: (Constant), Environmental sustainable practices						

The test deduces; F-statistic value, $F(1, 38) = 16.399$, $P = 0.000$ ($P < 0.01$). The results indicate that the study rejects the null in-turn accepting alternative hypothesis asserting that environmental sustainable practices impacts on organizational performance. Therefore, significant statistical

association exists between environmental sustainable practices and the organizational performance of pharmaceutical producers.

Table 4.8 Coefficients of Environmental Sustainable Practices versus Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.014	.776		1.306	.009
	Environmental sustainable practices	.730	.180	.549	4.050	.000

a. Dependent Variable: Organizational performance

The model equation for this test would be; $Y = A + \beta_1 X_1$, where Y= organization performance, β_1 is beta-coefficient for environmental sustainable practices and X_1 is environmental sustainable practices.

Therefore, equation generated by the test is: **Performance = 1.014 + 0.730*environmental sustainable practices**

Therefore, the study makes a finding that quantitative change in environmental sustainable supply chain practices trigger equivalent geometric change in organizational performance of pharmaceutical manufacturers in Nairobi County.

4.5 Social Sustainable Practices

Table 4.9 Mean & Standard Deviation for Social Sustainability

Factors for Social Sustainable Practices	N	Mean	Std. Deviation
Creating organizational department purely focused on CSR demonstrates pharmaceutical company's willingness to impact local communities thus building a positive image in the society.	40	4.35	.580
Increasing budgetary allocation for CSR programs boost pharmaceutical companies operations for giving back to the society thus building positive image and perception among its customers.	40	4.05	.783
Supporting education causes for the local community in proximity to the pharmaceutical company's production centers boost the company's profile and credibility in society.	40	4.43	.594

Pharmaceutical manufacturers employing locals to empower them with marketable technical skills positively boost the image of the company in the society.	40	4.33	.616
Supporting charitable organizations within the neighboring communities positively boosts the pharmaceutical company's image before internal and external stakeholders.	40	4.18	.874
Pharmaceutical manufacturers encouraging its employees to participate in charitable causes within the local communities boost its humane appeal to society and its customers.	40	4.20	.687

Further, The result show that that respondents were in agreement (Mean = 4.05, standard deviation =0.783) that increasing budgetary allocation for CSR programs boost pharmaceutical companies operations for giving back to the society thus building positive image and perception among its customers. The respondents also agreed that supporting education causes for the local community in proximity to the pharmaceutical company's production centers boost the company's profile and credibility in society, with a mean of 4.43 and standard deviation of 0.594.

In addition, the results indicate that respondents agree (mean=4.33, standard deviation=0.616) that pharmaceutical manufacturers employing locals to empower them with marketable technical skills positively boost the image of the company in the society. The respondents also agreed that supporting charitable organizations within the neighboring communities positively boosts the pharmaceutical company's image before internal and external stakeholders, with a mean of 4.18 and standard deviation of 0.874. Finally, the results show that respondents were in agreement that pharmaceutical manufacturers encouraging its employees to participate in charitable causes within the local communities boost its humane appeal to society and its customers, recording a mean of 4.20 of 0.687.

4.5.1 Inferential Statistics for Environmental Sustainable Supply Chain Practices

Table 4.10 Model Summary for Social Sustainable Practices versus Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.657 ^a	.431	.416	.50262
a. Predictors: (Constant), Social sustainable practices				

The results imply that social sustainable supply chain practices accounts for 43.1% in variability ($R^2=0.431$) in the organizational performance of pharmaceutical producers.

Table 4.11 ANOVA for Social Sustainable Practices versus performance

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.283	1	7.283	28.827	.000 ^b
	Residual	9.600	38	.253		
	Total	16.883	39			
a. Dependent Variable: Organizational performance						
b. Predictors: (Constant), Social sustainable practices						

Therefore the result implies that a significant statistical association exists between social sustainable supply chain factors and organizational performance of pharmaceutical producers.

Table 4.12 Coefficients for Environmental Sustainable Practices versus Performance

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.106	.755		.141	.002
	Social sustainable practices	.948	.176	.657	5.369	.000
a. Dependent Variable: Organizational performance						

The results imply for every unit change in social sustainable practices, triggers 0.948 units change in the organizational performance. Therefore, the study establishes that quantitative changes in social sustainable supply chain practices triggers substantial corresponding changes in the organizational performance of pharmaceutical manufacturers.

4.6 Economic Sustainable supply chain practices

The data on economic social sustainability is computed in table 4.13 aggregated in means and standard deviation.

Table 4.13 Mean & Standard Deviation for Economic Sustainability

Factors for economic sustainable supply chain practices	N	Mean	Std. Deviation
Integration of reverse logistics operational system boosts pharmaceutical manufacturer's resources saving and cost cutting measures.	40	4.33	.616
Integrating smarter and clean energy sources cuts overall costs on energy inputs thus boosting pharmaceutical company's financial performance.	40	4.30	.608
Introducing new green product designs results in reduction of costs incurred on logistics and production operation thus boosting cost cutting measures.	40	4.15	.662
Installation of smarter carbon saving emission infrastructure boosts overall production and operational efficiency.	40	4.13	.723
Utilizing green energy sources to run logistical installation in pharmaceutical production will ensure sustained operational continuity.	40	4.25	.809
Accurate reporting of financial returns by pharmaceutical producers and prompt remitting of taxes boosts operational creditability.	40	4.08	.797

The results also show that respondents were in agreement (mean=4.15, standard deviation=0.662) that introducing new green product designs results in reduction of costs incurred on logistics and production operation thus boosting cost cutting measures.

4.6.1 Inferential Statistics for the Economic Sustainable Practices versus Performance

The third inferential test for this study was a linear regression test between independent economic sustainable supply chain practices versus organizational performance of pharmaceutical manufacturers.

Table 4.14 Model Summary for Economic Sustainable Practices versus Performance

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.843 ^a	.711	.704	.35825
a. Predictors: (Constant), Economic sustainable practices				

The results imply that economic sustainable practices account for 71.1% in variability ($R^2 = 0.711$) in organizational performance of pharmaceutical manufacturers, with 28.9% of variability attributed to factors external to economic sustainable practices.

Table 4.15 ANOVA for Economic Sustainable Practices versus Performance

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.006	1	12.006	93.547	.000 ^b
	Residual	4.877	38	.128		
	Total	16.883	39			
a. Dependent Variable: Organizational performance						
b. Predictors: (Constant), Economic sustainable practices						

The Analysis of Variance (ANOVA) results in table 4.15 deduce; $F(1, 38) = 93.547$, and p-value of 0.000 ($p < 0.01$). The result implies that null hypothesis for the test is rejected in favor of alternative, which states; economic sustainable practices wield an effect on organizational performance..

Table 4.16 Coefficients for Economic Sustainable Practices versus Performance

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.376	.470		.800	.008
	Economic sustainable practices	1.074	.111	.843	9.672	.000

a. Dependent Variable: Organizational performance

The coefficients output in table 4.16 for the regression test between economic sustainable practices versus organizational performance, computes; $A = 0.376$ ($P=0.008$, $P < 0.01$), $\beta_3 = 1.074$ ($P=0.000$, $P < 0.01$).

The model equation for this test would be; $Y = A + \beta_3 X_3$, where Y = organizational performance, β_3 is beta-coefficient for economic sustainable practices and X_3 is economic sustainable practices.

Equation computed is: **organizational performance= 0.376 + 1.074*economic sustainable practices.**

The results imply that for every unit change in economic sustainable practices will trigger 1.074 units change in the organizational performance. The study thus establishes that positive changes in regard to economic sustainable supply chain practices will result in incremental changes in the organizational performance of pharmaceutical manufacturing companies.

4.7 Multivariate Regression Analysis for the Study

Table 4.17 Model Summary for the Multivariate Regression Test

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853 ^a	.728	.705	.35714
a. Predictors: (Constant), Economic sustainable practices, Environmental sustainable practices, Social sustainable practices				

The result imply that the combined independent factors for sustainability; environmental, social and economic account for 72.8% in variability ($R^2 = 0.728$) on the organizational performance of pharmaceutical producers, with 27.2% of variability attributed to factors external sustainability factors.

Table 4.18 ANOVA for Multivariate Regression Test

ANOVA ^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.291	3	4.097	32.121	.000 ^b
	Residual	4.592	36	.128		
	Total	16.883	39			
a. Dependent Variable: Organizational performance						
b. Predictors: (Constant), Economic sustainable practices, Environmental sustainable practices, Social sustainable practices						

The results imply, a significant statistical association exists between sustainable supply chain prs and the organizational performance of pharmaceutical manufacturing organizations.

Table 4.19 Coefficients for the Multivariate Regression Test

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error			
1	(Constant)	.856	.577		1.485	.004
	Environmental sustainable practices	.174	.158	.131	1.103	.008
	Social sustainable practices	.061	.206	.042	.297	.006
	Economic sustainable practices	.948	.157	.745	6.057	.000
a. Dependent Variable: Organizational performance						

The coefficients output in table 4.19 for the multivariate regression test between independent sustainable practices factors versus organizational performance, computes; $A = 0.856$ ($P=0.004$, $P < 0.01$), $\beta_1 = 0.174$ ($P=0.008$, $P < 0.01$), $\beta_2 = 0.061$ ($P=0.006$, $P < 0.01$). $\beta_3 = 0.948$ ($P=0.000$, $P < 0.01$).

The model equation for this test would be; $Y = A + \beta_1X_1 + \beta_2X_2 + \beta_3X_3$, where Y = organization performance, $\beta_{1,2,3}$ is beta-coefficient for all the independent sustainable practices and $X_{1,2,3}$ is the independent sustainable practices.

Therefore, the equation for the study model will be:

$$\text{Organizational performance} = 0.856 + 0.174 * \text{environmental sustainability} + 0.061 * \text{social sustainability} + 0.948 * \text{economic sustainability}$$

4.8 Discussion

The results computed in the study show that environmental sustainable practices notably; elimination of industrial exhaust pollution, integrating high-tech equipment for carbon emission control, raw materials diversification, adoption of clean energy and integration of reverse logistics wield a positive impact that results in incremental gain for the organizational performance of pharmaceutical producers. These findings are supported in Ahmed and Sarkar (2018), Cankaya and Sezen (2018), and Islam et al. (2018) who identified that solving the aspects of carbon emission, industrial pollution from exhaust fumes and chemical spillages that destroy the environment contributes to enhanced operational efficiency. Successful reversal of industrial and supply chain environmental destructive factors positively impacts on the operational output, which is an operational incremental gain for the pharmaceutical producing companies.

The second objective was to examine the effect of social sustainable supply chain practices on the organizational performance of pharmaceutical manufacturers. The results indicate that social sustainable practices wield a significant positive impact to the outcome of organizational performance. Social sustainable practices including; Integration of employee welfare programs, creation of work environment that is socially inclusive, support for community education, empowerment of local community members, supporting charity activities and uplifting the community in numerous ways contributes to boosting organization community cooperation which translates to enhanced operational efficiency. These findings are consistent with the submissions of Liu et al. (2018) who advocated for the importance of funding CSR programs in deepening corporate and community cooperation through social sustainable causes, which results in positively shaping the corporate image in the society. In addition, the findings support Batty et al. (2016) who posited that, corporate engagements in activities such as charity, environmental conservation and supporting local communities, positively boosted cooperation between corporate organizations and society which in-turn boosts growth.

The third objective in this study was determining how economic sustainable supply chain practices impacted organizational performance. The results show that the adoption and integration of economic sustainable practices contributed in positively driving operational performance for pharmaceutical firms with enhanced levels of operational efficiency. The results show that on the short-term, integration of economic sustainable supply chain practices is capital intensive but rewarding in the long-term with increased efficiency and lower costs for different input factors. Economic sustainable practices notably; reverse logistics, high-tech smart waste management systems, green production design, diversification clean energy sources and raw materials, were found to positively impact on organizational performance of pharmaceutical producers. The findings in this study support submissions of Marchi and Sanoni (2017) and, Misni and lee (2017) who postulated that economic sustainable strategies such as reverse logistics program and clean energy sources integration contributes to boosting long-term production efficiency with minimal operational costs in energy, transport and sourcing of input raw materials.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section sections gives conclusions drawn from the findings of the study.

5.2 Summary of the Findings

5.2.1 Effect of Environmental Sustainable Supply Chain on the Organizational Performance of Pharmaceutical Producers

The results demonstrate that independent factor of environmental sustainability yields variation and accounts for substantial quantitative change ($R^2 = 0.301$; $\beta_1 = 0.730$) in the organizational performance attributes for the pharmaceutical manufacturing companies.

The study established that key driving attributes of environmental sustainable supply chain are multifaceted in their cumulative impact on the organizational performance of pharmaceutical manufacturing companies. Notably, the aspects of change on organizational performance attributed to environmental sustainable practices include; efficiency in elimination of industrial exhaust pollution, integrating technologies for carbon emission control, diversification of sources for raw materials, integrating clean energy sources and finally adoption of reverse logistics strategy. The study found that positive adjustments in each of the environmental sustainability practice yields incremental cumulative outcome on organizational performance for the pharmaceutical manufacturers.

5.2.2 Effect of Social Sustainable Supply Chain Practices on the Organizational Performance for Pharmaceutical Producers

The study makes a finding that there exists a strong positive correlation ($R=0.657$) between social sustainable supply chain practices and the organizational performance of pharmaceutical producers. This is supplemented by determination of critical variability in pharmaceutical firms organizational performance ($R^2 = 0.431$) which is driven by dimension practices for social sustainability in pharmaceutical supply chain. Further, the results established that any value of quantitative change in social sustainable practices triggers parallel changes ($\beta_2 = 0.948$) on the organizational performance of pharmaceutical manufacturers.

The study establishes that cumulative impact on organizational performance is attributed to diverse dimensions' aspects that form the social sustainable supply chain practices. Incremental changes in any of these practices notably; budgetary allocation for CSR programs, organizational support for community education, empowering local communities, participation and support of charity activities that benefit the local community results in equivalent incremental value in the organizational performance of pharmaceutical manufacturers in Nairobi.

5.2.3 Effect of Economic Sustainable Supply Chain Practices on the Organizational Performance for Pharmaceutical Producers

The results provided evidence which shows economic sustainable practices account for substantial variability ($R^2 = 0.711$) in the organizational performance of pharmaceutical manufacturers. Equally the study found that quantitative changes in economic sustainable supply chain practices induced equivalent quantitative changes/adjustments ($\beta_3 = 1.074$) in the organizational performance for pharmaceutical manufacturing companies.

The study establishes that the main driver of economic sustainable practices is the impact on the level of operational efficiency that results in cost benefit value of cumulative gains in lowering operational costs for the pharmaceutical supply chain. Economic sustainable practices wielding positive effect on organizational performance for the pharmaceutical manufacturers include; integration of reverse logistics, adoption of smart waste technologies, integrating closed loop supply chain, embracing green production methods, diversification strategy for energy & raw materials and finally financing investments towards technologies for carbon print reduction.

5.3 Conclusions

5.3.1 Environmental Sustainable Supply Chain Practices and Organizational Performance

The study concludes that deployment of environmental sustainable supply chain strategy yields a positive outcome on the organizational performance for pharmaceutical manufacturing companies in Nairobi. Varied levels of environmental sustainability techniques within the scope of pharmaceutical supply chain result in positive operational changes that boosts overall production efficiency and reliability. Effective outcomes for environmental sustainable supply chain include; extensive reduction or elimination of exhaust pollution across pharmaceutical infrastructure,

deployment of technologies for carbon control in industrial pharmaceutical plants, diversification of clean energy sources and the adoption of closed loop supply chain.

5.3.2 Social Sustainable Supply Chain Practices and Organizational Performance

Driving social sustainable causes rallies positivity within the context of pharmaceutical supply chain which boosts the company image before the community thus resulting in friendlier working environment that ultimately leads to business progress for the pharmaceutical companies and the community they operate in. Areas that are vital in driving social sustainable causes by the pharmaceutical companies include; Sufficient funding for CSR community programs, involvement in community education causes, empowering members of local community and participation of staff in charity events for the benefit of the community. Rolling out social sustainable causes connects the pharmaceutical manufacturers with the communities which positively impacts the business environment due to the positive image.

5.3.3 Economic Sustainable Supply Chain Practices and Organizational Performance

Positive outcome in economic sustainable purview of pharmaceutical supply chain is reflected in enhanced level of cost effectiveness in regard to lasting sustainable solutions deployed in the supply chain that accrue value by lowering operational costs and optimizing productivity. The study concludes that measures notably; reverse logistics strategy, adoption of clean energy, introduction of green designs, cutting down on green emissions, integrating green energy sources and efficient systems for internal auditing and revenue reporting, have positive effect on enhancing organizational performance of pharmaceutical manufacturing companies.

5.4 Recommendations

There is need for reinvestment in the supply chain infrastructure with the installation of exhaust free systems. These include; adoption of electric powered vehicles, machines and storage equipment to eliminate the use of gasoline and fuel powered systems that emit fumes which pollute the environment.

Industrial plants redevelopment to integrate modern carbon control exhausts technologies. Controlling industrial exhaust will effectively cut any carbon output from the production floor of manufacturing firms. This strategy will effectively limit carbon emission attributed to the pharmaceutical production line.

There is need for community engagement by pharmaceutical manufacturers in areas of education, empowerment and public health initiatives. These encompass array of CSR programs that are aligned with the desire for achieving sustainability. Such measures can be implemented within the scope of pharmaceutical sector supply chain by integrating community centered activities aimed at mutual benefit of uplifting the community through skills development, affordable medical drugs and equipment and development of critical amenities for ensuring high levels of community hygiene.

Legal interventions through the establishment of new laws that regulates pharmaceutical industry across its entirety of supply chain to production floor. Such reforms in regulatory framework should also include incentives for the sectors aimed at motivating pharmaceutical companies adopt sustainable practices within the supply. Some of the incentives can be tax waivers or import duty waivers for importation of smart technologies for eliminating carbon emissions in factories, equipment for installation of clean energy etc.

5.5 Suggestions for Further Studies

The researcher identified critical areas of interest that will require further academic inquiry by future researchers. They include; an examination into the efficacy of full-scale integration of clean energy grid on the performance of industrial production process for pharmaceutical products. Secondly, the study suggests for more future inquiry towards an evaluation into the value of carbon print reduction as an outcome of green design strategy for the pharmaceutical sector.

REFERENCES

- Alhaddi, H. (2015). Triple bottom line and sustainability: A literature review. *Business and Management Studies*, 1(2), 6-10.
- Alzoubi, H., Ahmed, G., Al-Gasaymeh, A., & Kurdi, B. (2020). Empirical study on sustainable supply chain strategies and its impact on competitive priorities: The mediating role of supply chain collaboration. *Management Science Letters*, 10(3), 703-708.
- Aus der Beek, T., Weber, F. A., Bergmann, A., Hickmann, S., Ebert, I., Hein, A., & Küster, A. (2016). Pharmaceuticals in the environment—Global occurrences and perspectives. *Environmental toxicology and chemistry*, 35(4), 823-835.
- Bhusnure, O. G., Gholve, S. B., Giram, P. S., Warad, T. A., Pangave, V. S., & Sangshetti, J. N. (2015). Green approaches for the industrial production of active pharmaceutical ingredients. *World J. Pharm. Res*, 4, 629-648.
- Cooper, D., & Schindler, P. (2014). *Business Research Methods*. McGraw Hill.
- de Campos, E. A. R., de Paula, I. C., Pagani, R. N., & Guarnieri, P. (2017). Reverse logistics for the end-of-life and end-of-use products in the pharmaceutical industry: a systematic literature review. *Supply Chain Management: An International Journal*, 22(4), 375-392.
- Droppert, H., & Bennett, S. (2015). Corporate social responsibility in global health: an exploratory study of multinational pharmaceutical firms. *Globalization and health*, 11(1), 1-8. Available online: <https://link.springer.com/article/10.1186/s12992-015-0100-5> (Accessed on 25th August 2021).
- Freudenreich, B., Lüdeke-Freund, F., & Schaltegger, S. (2020). A stakeholder theory perspective on business models: Value creation for sustainability. *Journal of Business Ethics*, 166(1), 3-18.
- Harrington, L. M. B. (2016). Sustainability theory and conceptual considerations: a review of key ideas for sustainability, and the rural context. *Papers in Applied Geography*, 2(4), 365-382.

- Henry, L. A., Buyl, T., & Jansen, R. J. (2019). Leading corporate sustainability: The role of top management team composition for triple bottom line performance. *Business Strategy and the Environment*, 28(1), 173-184.
- James, P. (2014). *Urban sustainability in theory and practice: circles of sustainability*. Routledge.
- Kenya Pharmaceutical Technologies (2021). *List of Pharmaceutical Manufacturers in Kenya*. Available online at: <https://www.kenyapharmtech.com/kenya-pharmaceutical-manufacturers/> (Accessed on 28th August 2021).
- Kiswili, E. N., & Ismail, N. S. (2016). Role of sustainable procurement practices on supply chain performance of manufacturing sector in Kenya: A case study of East African Portland cement company. *European Journal of Logistics, Purchasing and Supply Chain Management*, 4(3), 1-31.
- Kongar, E., Haznedaroglu, E., Abdelghany, O., & Bahtiyar, M. O. (2015). A novel IT infrastructure for reverse logistics operations of end-of-life pharmaceutical products. *Information Technology and Management*, 16(1), 51-65.
- Korir, G. J. (2014). *Green supply chain management practices and performance of firms in automotive industry in Nairobi, Kenya* (Doctoral dissertation, University of Nairobi).
- Kumar, A., Zavadskas, E. K., Mangla, S. K., Agrawal, V., Sharma, K., & Gupta, D. (2019). When risks need attention: adoption of green supply chain initiatives in the pharmaceutical industry. *International Journal of Production Research*, 57(11), 3554-3576.
- Larsson, D. J. (2014). Pollution from drug manufacturing: review and perspectives. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 369(1656), 20130571.
- Mani, V., Agrawal, R., & Sharma, V. (2015). Supply chain social sustainability: A comparative case analysis in indian manufacturing industries. *Procedia-Social and Behavioral Sciences*, 189, 234-251.
- Miemyczyk, J., & Luzzini, D. (2019). Achieving triple bottom line sustainability in supply chains: The role of environmental, social and risk assessment practices. *International Journal of Operations & Production Management*, 39(2), 238 – 259.
- Milanesi, M., Runfola, A., & Guercini, S. (2020). Pharmaceutical industry riding the wave of sustainability: Review and opportunities for future research. *Journal of Cleaner Production*, 261, 121204.
- Murage, J. M. (2011). *Green supply chain initiatives and Challenges by manufacturing firms in Kenya* (Doctoral dissertation, University of Nairobi).

- Neri, A., Cagno, E., Lepri, M., & Trianni, A. (2021). A triple bottom line balanced set of key performance indicators to measure the sustainability performance of industrial supply chains. *Sustainable Production and Consumption*, 26, 648-691.
- Narayana, S. A., Pati, R. K., & Vrat, P. (2012). Research on management issues in the pharmaceutical industry: a literature review. *International Journal of Pharmaceutical and Healthcare Marketing*, 351 – 375.
- Nyatondo, O. T. (2019). *Role of green procurement practices on environmental performance of milk processing firms* (Doctoral dissertation, BUSE).
- Panigrahi, S. S., Bahinipati, B., & Jain, V. (2019). Sustainable supply chain management: A review of literature and implications for future research. *Management of Environmental Quality: An International Journal*, 30 (5), 1001–1049. Available online: <https://www.emerald.com/insight/content/doi/10.1108/MEQ-01-2018-0003/full/html> (Accessed on: 24th August 2021).
- Rocha, M. D. M., de Andrade, E. P., Alves, E. R., Cândido, J. C., & Borio, M. D. M. (2020). Access to innovative medicines by pharma companies: Sustainable initiatives for global health or useful advertisement?. *Global public health*, 15(6), 777-789.
- Sazvar, Z., Zokaee, M., Tavakkoli-Moghaddam, R., Salari, S. A. S., & Nayeri, S. (2021). Designing a sustainable closed-loop pharmaceutical supply chain in a competitive market considering demand uncertainty, manufacturer's brand and waste management. *Annals of Operations Research*, 1-32. Available online: <https://link.springer.com/article/10.1007/s10479-021-03961-0> (Accessed on 24th August 2021).
- Schneider, J. L., Wilson, A., & Rosenbeck, J. M. (2010). Pharmaceutical companies and sustainability: an analysis of corporate reporting. *Benchmarking: An International Journal*, 17(3), 421 – 434.
- Sloan, L., & Quan-Haase, A. (Eds.). (2017). *The SAGE handbook of social media research methods*. Sage.
- Toh, M. R., & Chew, L. (2017). Turning waste medicines to cost savings: a pilot study on the feasibility of medication recycling as a solution to drug wastage. *Palliative medicine*, 31(1), 35-41.
- Zandieh, M., Janatyan, N., Alem-Tabriz, A., & Rabieh, M. (2018). Designing sustainable distribution network in pharmaceutical supply chain: A case study. *International journal of supply and operations management*, 5(2), 122-133.

Zhi-Dong, L., Shu-shen, Z., Yun, Z., Yong, Z., & Li, W. (2011). Evaluation of cleaner production audit in pharmaceutical production industry: case study of the pharmaceutical plant in Dalian, PR China. *Clean Technologies and Environmental Policy*, 13(1), 195-206.

APPENDIX I: QUESTIONNAIRE

SECTION A: BACKGROUND INFORMATION

1. Age Distribution

- i. 18 – 30 years
- ii. 31 – 35 years
- iii. 36 – 40 years
- iv. 41 – 45 years
- v. Over 46 years

2. Education Level

- i. Certificate
- ii. Diploma
- iii. Undergraduate Degree
- iv. Post-graduate Degree

3. Department Attached

- i. Logistics and supply chain
- ii. Production
- iii. Corporate affairs
- iv. Research and development

4. Work Experience in the Pharmaceutical Manufacturing industry

- i. Below 5 years
- ii. 6 – 10 years

- iii. 11 – 15 years
- iv. 16 – 20 years
- v. Over 20 years

SECTION B: SUSTAINABLE SUPPLY CHAIN PRACTICES

Kindly indicate how you agree/disagree with the following statements on a scale of 1 to 5 as per the table below:

Level of Agreement				
(1)	(2)	(3)	(4)	(5)
Strongly Disagree	Disagree	Neutral	Agree	Strongly Disagree

SUSTAINABLE SUPPLY CHAIN FACTORS ON THE ORGANIZATIONAL PERFORMANCE OF PHARMACEUTICAL MANUFACTURERS						
No.	STATEMENTS	RATING				
		(1)	(2)	(3)	(4)	(5)
1.	Employing green operational strategy boosts the efficiency on operational execution for pharmaceutical producers.					
2.	Employing emission reduction exhaust systems in transportation systems and production plants reduces pollution attributed to pharmaceutical manufacturers					
3.	Embracing modern technologies for carbon emission controls in pharmaceutical production plants boosts operational efficiency.					

4.	Diversification of sources for raw materials used in pharmaceutical production prevents overreliance of existing sources boosting long-term smart productivity.					
5.	Embracing clean energy sources in production lines will boost operational effectiveness and limit environmental damage due to energy utilization					
6.	Building capacity for logistics and production staff in relation to operational practices will enhance operational efficiency and limit environmental damage attributed to pharmaceutical production operations.					
7.	Embracing reverse logistics strategy for product movement eliminates wastages and pollution thus boosting operational efficiency.					
8.	Investing on pharmaceutical production and logistics infrastructure that is environmentally sustainable compliant boosts operational efficiency.					
9.	Creating organizational department purely focused on CSR demonstrates pharmaceutical company's willingness to impact local communities thus building a positive image in the society.					
10.	Increasing budgetary allocation for CSR programs boost pharmaceutical companies operations for giving back to the society thus building positive image and perception among its customers.					
11.	Supporting education causes for the local community in proximity to the pharmaceutical company's production centers boost the company's profile and credibility in society.					
12.	Pharmaceutical manufacturers employing locals to empower them with marketable technical skills positively boost the image of the company in the society.					
13.	Supporting charitable organizations within the neighboring communities positively boosts the pharmaceutical company's image before internal and external stakeholders.					
14.	Pharmaceutical manufacturers encouraging its employees to participate in charitable causes within the local communities boost its humane appeal to society and its customers.					
15.	Integration of reverse logistics operational system boosts pharmaceutical manufacturer's resources saving and cost cutting measures.					
16.	Integrating smarter and clean energy sources cuts overall costs on energy inputs thus boosting pharmaceutical company's financial performance.					
17.	Introducing new green product designs results in reduction of costs incurred on logistics and production operation thus boosting cost cutting measures.					

18.	Installation of smarter carbon saving emission infrastructure boosts overall production and operational efficiency.					
19.	Utilizing green energy sources to run logistical installation in pharmaceutical production will ensure sustained operational continuity.					
20.	Accurate reporting of financial returns by pharmaceutical producers and prompt remitting of taxes boosts operational creditability.					

SECTION C: ORGANIZATIONAL PERFORMANCE OF PHARMACEUTICAL MANUFACTURERS						
No.	STATEMENTS	RATING				
		(1)	(2)	(3)	(4)	(5)
1.	Adoption of smart waste management methods contributes to enhanced operational efficiency					
2.	Embracing closed loop supply chain boost levels of operational coordination thus boosting efficiency.					
3	Increasing intensity of charity events boost awareness of prices for pharmaceutical products and ease accessibility					
4.	Integrating green production system contributes in eliminating carbon footprint from pharmaceutical production lines					
5.	Diversification of production system inputs results in reduction operational costs and equally reducing prices for vital drugs making them affordable to majority of society					
6.	Adopting a carbon cutting production strategy will increase the utilization of green manufacturing capacity thus					

	significantly reducing carbon emission from pharmaceutical plants.					
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Thank you very much for your participation