



AN ASSESSMENT OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT  
PRACTICES IN  
THE UPSTREAM PHARMACEUTICAL INDUSTRY OF GHANA.

Submitted in fulfilment of the requirements of the degree of

Doctor of Philosophy in Management Sciences.

Specializing in Public Administration / Public Management

in the

Faculty of Management Sciences

at the

Durban University of Technology

GIFTY KUMADEY

OCTOBER 2023

SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRACTICES IN  
THE UPSTREAM PHARMACEUTICAL INDUSTRY OF GHANA.

Submitted in fulfilment of the requirements of the degree of Doctor of  
Philosophy in Management Sciences Specializing in Public Administration /  
Public Management

in the Faculty of Management Sciences at the Durban University of Technology

(GIFTY KUMADEY)

OCTOBER 2023

APPROVED FOR FINAL SUBMISSION BY

Supervisor: Prof. A.T. Agbenyegah

Signature

---

October 2023

Date:

## **DECLARATION**

I declare that the thesis herewith submitted for the Doctor of Philosophy in Management Sciences (Public Administration / Public Management) studies at the Durban University of Technology has not been previously submitted for a degree at any other university.

---

Gifty Kumadey

## **ABSTRACT**

The drive for the adoption of Sustainable Supply Chain Management practices among pharmaceutical companies is on the rise given the global effort to attain net zero of carbon emissions as well as attaining other targets for the sustainable development goals. The pharmaceutical industry plays vital role in the manufacturing and distribution of medications, and therefore sustainability issues are critical for the survival of the industry. However, the adoption of sustainable practices in the upstream pharmaceutical industry is still low, and there is lack of empirical research in this area, particularly in emerging economies like Ghana. This study aims to fill this gap by examining the level of adoption of sustainable supply chain practices, focusing on the role of the policy framework, the influence of these practices on company performance, and the role of top executives in ensuring sustainability.

The study utilizes a mixed method approach and leverages the upper echelon theory to explore the role of managers on sustainable supply chain practices. This dissertation explore the state of the upstream pharmaceutical Sustainable Supply Chain Management practices in Ghana, evaluate the role of the upstream pharmaceutical policy framework of Ghana on supply chain sustainability, identify how upstream pharmaceutical Sustainable Supply Chain Management Practices influence the performance of pharmaceutical companies in Ghana, and to examine the role of top management in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana. By addressing the above objectives, the study promotes academic debate and provides insights for policy directions in the pharmaceutical industry for sustainable growth and development. The research design includes both explanatory and exploratory approaches, with a concurrent/parallel mixed methods design combining quantitative and qualitative data. Specifically, the concurrent triangulation design mixed method was adopted. The target population was employees of locally owned upstream pharmaceutical companies in the Greater Accra region of Ghana. From a finite population of about 2000, stratified and purposive strategies were used to select 18 participants under the qualitative aspect, while random sampling technique was used to select 334 for the quantitative aspect of the study. Therefore, the total sample size for this study was 352 participants. Data collection involved the use of questionnaire and structured interview guide, and data analysis included structural equation modeling for quantitative data and thematic analysis as well as content analysis for qualitative data.

Quantitative results indicated that Sustainable Supply Chain Management practices have a positive significant association with Sustainable Supply Chain Management performance for

upstream pharmaceutical companies. Results showed that, there was positive impact of Top Management Commitment on Sustainable Supply Chain Management to performance. Furthermore, there was justification for Top Management Commitment as a moderator on the association between Sustainable Supply Chain Management practices and Sustainable Supply Chain Management performance. The study's findings on sustainable supply chain management practices in the upstream pharmaceutical sector in Ghana have significant theoretical, managerial, and policy implications. The interviews revealed the importance of socially inclusive practices, eco-friendly manufacturing, waste management, supplier involvement, and collaborations are important factors to consider in achieving sustainability goals. Theoretical implications include the recognition of responsible sourcing as a crucial component of sustainable supply chain management and the importance of socially responsible human resource management strategies. Managerially, the adoption of green manufacturing practices, waste management, and supplier engagement are highlighted as strategies for enhancing sustainability. Policy implications emphasize the need for supportive policies and regulations that promote responsible sourcing, green manufacturing, waste management, and supplier engagement in the upstream of pharmaceutical industry. The study contributes to the literature by providing empirical evidence of the positive association between sustainable supply chain management and organizational performance. The role of top management in ensuring the adoption and implementation of sustainable supply chain management practices is crucial, with implications for leadership, resource allocation, collaboration, and stakeholder engagement. Policy-wise, support for sustainable supply chain management practices and capacity-building initiatives are crucial for the adopting and implementations of these practices within the pharmaceutical industry. Overall, the study provides insights for theory, practice, and policy to enhance sustainability in the pharmaceutical supply chain.

**Keywords: Sustainable supply chain management (SSCM); Pharmaceutical Manufacturing industry; Upper echelon theory; Structural Equation Modelling (SEM).**

## **DEDICATION**

This study is dedicated to my family, New Breed Takoradi Technical University and More Than Conquerors Missionaries. My beautiful, precious family.

“The journey with the people we love is all that really matters. Such a simple truth, so easily forgotten” – Unknown.

## ACKNOWLEDGEMENTS

I want to express my deep gratitude to all those who played diverse roles in the completion of this study. My heartfelt appreciation begins with the Almighty God, who has blessed me with grace, love, and life. I am thankful for the talents and skills bestowed upon me, all for His glory. As Psalm 8:4 says, "What is man that You are mindful of him?"

I extend my sincere thanks to my dedicated research supervisor, Prof. A.T. Agbenyegah, for providing professional guidance, expert advice, and unwavering encouragement throughout my academic journey. Our connection dates back almost five years, beginning at a conference in Takoradi Technical University, and I couldn't have asked for a better mentor. Your motivation, support, and presence during challenging times have been invaluable. You are more than just a mentor; you're family to me.

I also acknowledge the contributions of my initial supervisor, Dr. Strinivasan Soondrasan Pillay, the head of the Department of Public Management and Economics, and the co-supervisor, Dr. Alice Constance Mensah. Their role at the start of my PhD journey at DUT is deeply appreciated. Dr. Emem Anwana, Research Director at the Faculty of Management Sciences, has been a source of constant support, scholarly insight, and motivation. My heartfelt gratitude to Mr. Stephen Amemo for his invaluable support with my official work. I will forever be thankful to Gilbert Boateng and Joshua Sosu, my friends through thick and thin. Thanks for your support in the moments when there was no one to answer my queries.

I would like to express my gratitude to Minister Brandsford Gidigah (Doctoral candidate at the Kwame Nkrumah University of Science and Technology, Kumasi) for his invaluable support and meticulous review of my work. Your comprehensive editing of my thesis is greatly appreciated. Mr. Prince Kofi Mensah, your assistance with data analysis and proofreading has been exceptional, and I am thankful for your patience and kindness, even in challenging moments.

Finally, I want to acknowledge Lucia Addae-Ntiri, the Executive Secretary of the Pharmaceutical Manufacturers Association of Ghana, as well as the management and staff who participated in the survey process. Your knowledge and contributions to this research have been immensely valuable.

## Table of Contents

DECLARATION .....	III
ABSTRACT.....	IV
LIST OF FIGURES .....	XIV
LIST OF TABLES.....	XV
LIST OF ABBREVIATIONS.....	XVI
LIST OF APPENDICES.....	XVII
CHAPTER ONE .....	1
INTRODUCTION TO THE STUDY .....	1
1.1 INTRODUCTION.....	1
1.2 RESEARCH BACKGROUND .....	1
1.3 RESEARCH CONTEXT.....	3
1.4 STATEMENT OF THE PROBLEM .....	4
1.5 AIM OF THE STUDY .....	6
1.6 OBJECTIVES OF THE STUDY .....	6
1.7 SIGNIFICANCE OF THE STUDY .....	7
1.9 SCOPE AND DELIMITATION .....	8
1.10 RESEARCH METHODOLOGY .....	9
1.11 RESEARCH STRUCTURE .....	10
1.12 CHAPTER SUMMARY .....	12
CHAPTER TWO .....	14
CONCEPTUAL AND THEORETICAL REVIEW .....	14
2.1 INTRODUCTION.....	14
2.2 CONCEPTUAL ISSUES.....	14
2.2.1 <i>Background to Pharmaceutical Supply Chain</i> .....	14
2.2.2 <i>Brief Historical Development of Supply Chain Management</i> .....	20
2.2.3 <i>Sustainable Supply Chain management (SSCM)</i> .....	25
2.2.3.1 <i>The Triple Bottom Line (TBL)</i> .....	28
2.2.3.2 <i>Sustainable Supply Chain and the Sustainable Development Goals (SDGs)</i> ..	33
2.2.4 <i>Historical Antecedents of Sustainable Supply Chain management.</i> .....	36

2.2.5	<i>State of upstream pharmaceutical sustainable supply chain management</i>	41
2.2.6	<i>Pharmaceutical Supply Chain Management in Ghana</i>	44
2.2.7.1	Supplier Compliance Auditing	47
2.2.7.2	Sustainable Packaging	48
2.2.7.3	Designing products with recyclable materials.	48
2.2.7.4	Company-Wide Environmental Audits.	49
2.2.7.5	Environmental Safety Practices	50
2.2.7.6	Strategic Orientation	51
2.2.7.7	Continuity	51
2.2.7.8	Collaboration.	51
2.2.7.9	Risk Management	52
2.2.7.10	Ethical and Responsible Sourcing	52
2.2.8	<i>Objective Two: The role of the upstream pharmaceutical policy framework of Ghana on the supply chain sustainability.</i>	53
2.2.9	<i>Objectives Three: Influence of upstream pharmaceutical sustainable supply chain management practices and company performance.</i>	58
2.2.10	<i>Objectives Four: The role of top- management in ensuring upstream pharmaceutical sustainable supply chain management.</i>	60
2.2.11	<i>Supply Chain Operations Reference Model (SCOR model)</i>	62
2.3	UPPER ECHELON THEORY	64
2.4	CONCLUSION	65
CHAPTER THREE		67
EMPIRICAL REVIEW AND HYPOTHESES DEVELOPMENT		67
3.1	INTRODUCTION	67
3.2. 1	<i>Global Perspectives</i>	68
3.2.2	<i>Ghana in Context</i>	70
3.3	HYPOTHESES DEVELOPMENT	71
3.3.1	<i>Link between SSCM practices and Operations practices</i>	73
3.3.2	<i>Link between SSCM practices and Supply chain integration</i>	74
3.3.3	<i>Link between Link between SSCM practices and Environmental management practices</i>	74
3.3.4	<i>Link between SSCM practices and socially inclusive practices for employees</i>	75
3.3.5	<i>Link between SSCM practices and socially inclusive practices for community</i>	76

3.3.6 <i>Link between sustainable supply chain management (SSCM) practices and SSCM performance outcomes.</i> .....	77
3.3.7 <i>Top-management commitment moderating the relationship between sustainable supply chain management (SSCM) practices and SSCM performance outcomes.</i> .....	77
3.3.8 <i>Linkage of top management commitment and pharmaceutical sustainable supply chain management performance.</i> .....	78
3.4 CONCEPTUAL FRAMEWORK .....	79
3.5 LINKING THE THEORETICAL FOUNDATION TO THE FRAMEWORK.....	82
3.6 CHAPTER SUMMARY .....	82
CHAPTER FOUR.....	84
METHODOLOGY .....	84
4.1 INTRODUCTION.....	84
4.3 RESEARCH PHILOSOPHY .....	88
4.3.1 <i>Positivist Research Philosophy</i> .....	89
4.3.2 <i>Interpretivist Research Philosophy</i> .....	90
4.3.3 <i>Pragmatism Research Philosophy</i> .....	90
4.3.4 <i>Realism Philosophy</i> .....	91
4.4 RESEARCH APPROACH .....	93
4.4.1 <i>Deductive Approach</i> .....	94
4.4.2 <i>Inductive Approach</i> .....	94
4.4.3 <i>Abductive Research Approach</i> .....	94
4.5 RESEARCH DESIGN.....	98
4.5.1 <i>Quantitative Research Design</i> .....	98
4.5.2 <i>Qualitative Research Design</i> .....	99
4.5.3 <i>Mixed Method Research Design</i> .....	99
4.5.4 <i>Choice of research design</i> .....	103
4.6 RESEARCH STRATEGY .....	105
4.6.1 <i>Experimental Research Strategy</i> .....	106
4.6.2 <i>Survey Research Strategy</i> .....	106
4.6.3 <i>Case Study Research Strategy</i> .....	107
4.6.4 <i>Action Research Strategy</i> .....	107
4.6.5 <i>Research Strategy Adopted.</i> .....	108
4.6 THE SAMPLING PROCESS.....	108

4.7 POPULATION .....	108
4.8 SAMPLING METHOD .....	110
4.8.1 Probability Sampling Method.....	111
4.8.2 Non-Probability Sampling Method.....	111
4.9 SAMPLE SIZE DETERMINATION .....	113
4.10 RESEARCH HORIZON .....	115
4.11 RESEARCH INSTRUMENTS.....	115
4.12 DATA COLLECTION .....	120
4.13 DATA ANALYSIS .....	123
4.14 PILOT STUDY .....	128
4.15 DELIMITATIONS/SCOPE.....	130
4.16 VALIDITY AND RELIABILITY/TRUSTWORTHINESS .....	130
4.17 ANONYMITY AND CONFIDENTIALITY .....	131
4.18 ETHICAL CONSIDERATIONS .....	131
4.19 METHODOLOGY CHAPTER SUMMARY .....	133
CHAPTER FIVE .....	135
RESULTS AND DISCUSSION.....	135
5.1 INTRODUCTION.....	135
5.2 QUALITATIVE RESULTS.....	135
5.2.1 State of the upstream pharmaceutical sustainable supply chain management practices in Ghana.....	136
5.2.2 Role of the upstream pharmaceutical policy framework of Ghana on supply chain sustainability.....	140
5.3 QUANTITATIVE RESULTS .....	146
5.3.1 Respondents' Descriptive statistics.....	146
5.3.2 Descriptive statistics for variables.....	147
5.3.3 Normality Test.....	152
5.3.4 Reliability and validity of the constructs .....	155
5.3.4.1 Convergent and Discriminatory Validity.....	157
5.3.5 Model Fit.....	160
5.3.6 Coefficient of determination (R <sup>2</sup> ). .....	161
5.3.6 Regression Summary.....	161
5.4 DISCUSSION OF RESULTS.....	163

5.4.1 Objectives 1: State of upstream pharmaceutical sustainable supply chain management practices in Ghana .....	163
5.4.2 Objective 2: Role of the upstream pharmaceutical policy framework of Ghana on the supply chain sustainability.....	166
5.4.3 Objective 3: How upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana.....	166
5.4.4 Objective 4: Role of top management in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana.....	167
CHAPTER SIX.....	171
SUMMARY OF FINDINGS AND CONTRIBUTIONS .....	171
6.1 INTRODUCTION.....	171
6.2 SUMMARY OF FINDINGS .....	171
6.2.1 Objective 1 Findings.....	171
6.2.1.1 Theoretical Contribution.....	171
6.2.1.2 Managerial Contribution.....	171
6.2.1.3 Policy Contribution.....	172
6.2.2 Objective 2 Findings .....	173
6.2.2.1 Theoretical Implications .....	173
6.2.2.2 Managerial Implications: .....	174
6.2.2.3 Policy Implications .....	174
6.2.3 Findings on objective 3.....	175
6.2.3.1 Theoretical Implications: .....	175
6.2.3.2 Managerial Implications: .....	175
6.2.3.3 Policy Implications .....	176
6.2.4 Objective 4 Finding.....	176
6.2.4.1 Theoretical Implications: .....	177
6.2.4.2 Managerial Implications .....	177
6.2.4.3 Policy Implications .....	178
CHAPTER SEVEN .....	179
CONCLUSIONS AND RECOMMENDATIONS .....	179
7.1 INTRODUCTION.....	179
7.2 CONCLUSION.....	179

7.2.1 <i>Impact of Sustainable supply chain management (SSCM) on performance outcomes.</i>	179
7.2.2 <i>Top Management Commitment in ensuring the increased business performance.</i>	180
7.2.3 <i>Top Management Commitment (TMC) in ensuring sustainable supply chain management performance.</i>	181
7.3 RECOMMENDATIONS	182
7.3.1 <i>Recommendation for the adoption of Sustainable supply chain management (SSCM) for improved performance outcomes.</i>	183
7.3.2 <i>Recommendation for Top Management Commitment (TMC) for attainment of sustainable supply chain management performance.</i>	184
7.3.3 <i>Limitation of the study</i>	186
7.3.4 <i>Recommendation for Future Research</i>	187
REFERENCE	188
APPENDIXES	233
APPENDIX A: LETTER OF INFORMATION (TOP MANAGEMENT)	233
APPENDIX B: LETTER OF INFORMATION (EMPLOYEES)	237
APPENDIX C: QUESTIONNAIRE (EMPLOYEES)	241
APPENDIX D: INTERVIEW GUIDE FOR UPSTREAM PHARMACEUTICAL COMPANIES (TOP MANAGEMENT)	246
APPENDIX E: INTERVIEW GUIDE FOR PUBLIC SECTOR INSTITUTIONS	248
APPENDIX F: ETHICS CLEARANCE LETTER	249
APPENDIX G: PERMISSION TO CONDUCT INTERVIEWS AT GHANA PHARMACEUTICAL INDUSTRY	250
APPENDIX H: LETTERS OF PERMISSION / GATEKEEPER'S LETTERS	251
APPENDIX I: TURNITIN REPORT	253

## LIST OF FIGURES

Figure 2. 1 Figure 2. 1 The five-tier model of the supply chain.....	17
Figure 2. 2 Historical developments of Supply Chain Management.....	21
Figure 2. 3 Sustainability Parameters.....	31
Figure 2. 4 Sustainability Pillars.....	36
Figure 2. 5 A Practical Approach to Pharmaceutical Supply Chain Management in Ghana. .	46
Figure 2. 6 Hierarchy of Laws, Regulations, and Implementing Agencies in the Pharmaceutical Sector. ....	58
Figure 2. 7 SCOR Model.....	63
Figure 3. 1 The proposed research framework.....	80
Figure 4. 1 The Research Onion.....	86
Figure 4. 2 Deductive and Inductive Approaches.....	93
Figure 4. 3 Deductive, inductive and abductive approaches. ....	95
Figure 4. 4 Basic Mixed Methods Research Designs. ....	103
Figure 4. 5 Mixed research approach.....	105
Figure 4. 6 Population, target population and sample in research. ....	110
Figure 4. 7 Phases of Thematic Analysis.....	124
Figure 4. 8 Data Analysis Process.....	127
Figure 5. 1 Structural Model.....	163

## LIST OF TABLES

Table 2. 1 The evolution of SCM towards sustainability .....	22
Table 3. 1 Constructs Definitions .....	81
Table 4. 1 Ethical Issues .....	132
Table 4. 2 Chapter Summary .....	133
Table 5. 1 Interviewees Background Information .....	135
Table 5. 2 Institutions for Policy Framework .....	141
Table 5. 3 Respondents Demographic Information .....	146
Table 5. 4 Descriptive Information for quantitative data.....	147
Table 5. 5 Test of Normality.....	153
Table 5. 6 Reliability and Validity Measures .....	155
Table 5. 7 Heterotrait-monotrait (HTMT) ratio of correlations.....	159
Table 5. 8 Goodness of Fit Summary .....	160
Table 5. 9 Model Summary .....	161
Table 5. 10 Coefficient of Regression .....	161

## LIST OF ABBREVIATIONS

SSCM	Sustainable Supply Chain Management
SENP	Sustainable Environmental Performance
SECP	Sustainable Economic Performance
OP	Operational Practices
SCI	Supply Chain Integration
EMP	Environmental Management Practices
SIPE	Socially Inclusive Practices for Employees
SIPC	Socially Inclusive Practices for Community
EPR	Environmental performance
OPR	Operations performance
CSP	Community-Centered social performance
TMC	Top Management Commitment

## **LIST OF APPENDICES**

Appendix A: Letter of information (Top Management)

Appendix B: Letter of information (Employees)

Appendix C: Questionnaire (Employees)

Appendix D: Interview Guide for Upstream Pharmaceutical Companies (Top management)

Appendix E: Interview Guide for Public Sector Institutions

Appendix F: Ethics clearance letter

Appendix G: Permission to conduct interviews at Ghana Pharmaceutical Industry

Appendix H: Letters of permission / Gatekeeper's letters

Appendix I: Turnitin report

# CHAPTER ONE

## INTRODUCTION TO THE STUDY

### 1.1 Introduction

Chapter 1 delve into Ghana's upstream pharmaceutical industry, with a primary focus on the manufacturers within the sector. These manufacturers, whether local or foreign, are pivotal players, shaping the industry's supply chain sustainability by producing pharmaceutical products from raw materials sourced from the environment and society. The study's core objective is to understand how these pharmaceutical manufacturing companies navigate the complex landscape of supply chain sustainability, especially in the face of growing global crises and increasing demands for pharmaceutical products. The study highlights the critical question of how these firms can effectively implement sustainable supply chain practices to meet the diverse demands of their product portfolio. This chapter introduces the research's problem statement, objectives, questions, and hypotheses while outlining the research's scope, significance, and structural roadmap for subsequent chapters. The chapter further provides how Sustainable Supply Chain Management (SSCM) practices impact the pharmaceutical sector's initial stages in Ghana. This chapter also elucidates the organization of the dissertation, outlining a definite path for subsequent chapters to maintain a logical progression of ideas within the research.

### 1.2 Research Background

The pharmaceutical industry is a global organization that is responsible for manufacturing and distribution of medications to a country and beyond. Pharmaceutical sustainable supply chain management can be seen in five tiers namely, primary manufacturing, secondary manufacturing, main and local distribution centers, and destination zones according to Doumbia, Awudu, Yakubu & Gonela (2021) and Lee & Ha (2021). The market environment of an organization experiences different changes continually and since these changes affect operations and profitability, an organization must position itself to take advantage of these changes. Firms that cannot adopt to the new ways of operation in this global world, either lose resources or eventually collapse. Several studies concur that, Sustainable Supply chain management (SSCM) may be considered as the effective and efficient management of the associated environment, social, and economic consequences in the construction and maintenance of global supply chains (Muñoz-Torres, Fernández-Izquierdo, Rivera-Lirio, Ferrero-Ferrero & Escrig-Olmedo 2020; Thorlakson, De Zegher & Lambin 2018; Dubey et al.

2017). Sustaining the environment and social demand ensures that businesses become sustainable in their operations. Leveraging the existing supply chain to ensure sustainable business development is one of the numerous strategies businesses market leaders deploy (Adjei-Bamfo, Maloreh-Nyamekye & Ahenkan 2019; Scholten & Fynes 2017a). Empirical study by Nsowah and Phiri (2023) made some efforts to examine Sustainable Supply Chain Management (SSCM) practices of 303 manufacturing firms in Ghana with an annual turnover of at least \$1,000,000. The researchers used closed-ended questionnaire to collect data on sustainable product design, sustainable process design, supply-side collaboration, and demand-side collaboration. The data analysis revealed that the mean scores for these practices were 4.44, 4.48, 4.52, and 4.52, respectively. The study identified various issues that policymakers should address to promote SSCM practices, including energy and material consumption, recycling and recovery, standardized product design, environmentally friendly materials and processes, easy disassembly, and product life cycle analysis. The study recommended that all manufacturing firms in Ghana and worldwide adopt SSCM practices and collaborate with customers to achieve sustainability goals (Nsowah & Phiri 2023). Other studies on Sustainable Supply Chain Management practices by Hong, Zhang and Ding (2018) explored the relationship between Sustainable Supply Chain Management (SSCM) practices, supply chain (SC) dynamic capabilities, and enterprise performance. Specifically, it investigated how SSCM practices impact SC dynamic capabilities and various dimensions of enterprise performance (economic, environmental, and social). The researchers collected data from 209 manufacturing firms in China and analyzed it using structural equation modelling (Hong, Zhang & Ding 2018). The results indicate that SSCM practices positively influence SC dynamic capabilities and all three dimensions of enterprise performance. However, SC dynamic capabilities only positively affect environmental performance and have no impact on economic and social performance. Additionally, the study revealed that SC dynamic capabilities partially mediate the relationship between SSCM practices and enterprise performance. The findings highlighted the significance of reinforcing SC dynamic capabilities and implementing effective SSCM practices, particularly for firms in developing countries, to enhance overall performance (Hong et al. 2018). Wang and Dai (2018) on their part investigated the impact of sustainable supply chain management (SSCM) practices on the performance of Chinese firms. The aim of the study was to develop a comprehensive model that incorporates internal and external SSCM practices and assesses their impact on corporate sustainability performance. The authors analyzed data from 172 Chinese firms and use Partial Least Square (PLS) structural equation methods to evaluate

the effects of SSCM practices on economic, environmental, and social performance. The findings indicated that internal SSCM practices positively influence environmental and social performance, which in turn positively affect economic performance. The study contributed to understanding the importance and benefits of SSCM practices for Chinese firms (Wang & Dai 2018). Adegoke et al. (2021) assessed the impact of SSCM practices on performance of organizations in Ghana. Three factors were used to assess the success of the organization: competitiveness (COMP), sustainable economic performance, and sustainable environmental performance (SENP). Endogenous variables comprised the three dimensions of company performance, while exogenous factors included the constructs of Sustainable Supply Chain Management (SSCM) practices and the single-item construct voluntary adoption of SSCM practices. Structural equation modeling was used to determine how sustainable management practices and organizational performance relate to one another. The following list of noteworthy findings is provided: (1) Environmental Management Practices (EMP) lead to improved Sustainable Environmental Performance (SENP) and Sustainable Economic Performance (SECP); (2) Organizational Performance has a significant and positive relationship with SECP and COMP; and (3) SECP has a significant and favorable relationship with competitiveness, sustainable environmental performance, and sustainable economic performance. It is clear from the positive correlation between SSCM practices and company performance that applying sustainable management concepts over time will increase a community's capability (Adegoke et al. 2021). The pharmaceutical industry holds a distinctive position in society as it is responsible for the production and distribution of life-saving medications. Consequently, the relevance of SSCM within this industry becomes a pertinent subject of inquiry. Critical questions that arise are, to what extent do sustainable supply chain practices align with the pharmaceutical industry's goals and responsibilities? How do these practices contribute to the industry's ability to meet the healthcare needs of the population while minimizing its environmental and social footprint? The next section explains, brief research context of the research.

### **1.3 Research Context**

The upstream pharmaceutical industry of Ghana is of central concern in this study. This study shall focus on the upstream pharmaceutical industry of Ghana. Thus, manufacturing companies within the pharmaceutical industry are those of concern within this study. The manufacturing pharmaceutical companies within Ghana are chosen for this study because they are those who

are largely engaged in the production of medicine and/or drugs by using raw materials from the environment and society. Thus, these manufacturing concerns that are within the upstream pharmaceutical industry of Ghana contribute to sustainability of the supply chain. Meeting environmental, societal, and economic goals has been the main focus of a sustainable supply chain. These are particularly linked with the attainment of Sustainable Development Goals (SDGs 3, 6, 12 and 13). But the attainment of these targets has eluded many companies within the supply chain in bringing goods and services to their final consumers according to Muñoz-Torres et al. (2020); Thorlakson et al. (2018); and Dubey et al. (2017)). The growing societal expectations on companies to protect the environment is becoming more intense and complex, given the rise in several global pandemic and crisis. Demand for drugs during pandemics has increased from business-to-business level and business to customer demand as suggested by Hedima, Adeyemi & Ikunaiye (2020). Pharmaceutical companies are therefore under intense pressure to produce and supply drugs on time to customers.

In the Pharmaceutical sector, sustainability issues take center stage (Zahiri, Zhuang & Mohammadi 2017a; Simon & Kotei 2014). Regulations within different markets are placing pressure on pharmaceutical companies to become sustainable in production. Given the pressure to meet divergent demands within different markets, pharmaceutical companies must be seen to be responsive and strategize their production and supply chain practices to meet varied demands. The critical question that arises is; how does a pharmaceutical company ensures adequate supply chain sustainability practices to satisfy varied demands for its products? Based on the foregoing, this study leveraged on the understanding of upper echelon theory (Plöckinger, Aschauer, Hiebl & Rohatschek 2016a; Ting, Azizan & Kweh 2015a) to examine how managers could contribute to the attainment of sustainable supply chain practices within the upstream pharmaceutical industry in Ghana. The next section explains, in detail, the research gaps this research addresses.

#### **1.4 Statement of the Problem**

Previous studies have shown that, the adoption of sustainable supply chain practices in the upstream of pharmaceutical industry is still low and, in some instance, done voluntarily (Muñoz-Torres et al. 2020; Thorlakson et al. 2018). Economic, cultural, and regulatory factors in developing economies can impede SSCM implementation. The absence of contextual studies in pharmaceutical supply chains highlights this issue (Ruppel 2022). In addition, businesses in Ghana are experiencing rising cost. Some of the factors accounting for such a situation are the

pressure on the supply chain to deliver on time and the complexities of current trends in demand (Hobbs 2020; Pettersson & Segerstedt 2013).

The Intergovernmental Panel on Climate Change, (IPCC), (2016) report revealed that supply chain manufacturing activities that emits gas or toxic wastes alone contributes to 12.9% of global emissions from gas, toxic waste, water and air pollution, and energy misuse. Due to the large volumes of emissions, the lives and livelihood of communities are threatened within the environment. Therefore, adopting sustainable engagements and practices within the supply chain of pharmaceutical companies has become necessary (Zahiri et al. 2017a).

Even though extant literature has emphasized top management meets their obligation by enforcing sustainable initiatives (Zahiri et al. 2017a), there is a lack of empirical research evidence within the pharmaceutical industry in emerging economies such as Ghana. Adherence to SSCM practices within the Pharmaceutical Industry in Ghana has not been examined in greater extent. From 2015 to date, not much empirical studies have been undertaken to assess the extent to which SSCM practices has been complied with and or deployed within the pharmaceutical industry in Ghana as suggested by Asamoah, Nuerterey, Agyei-Owusu & Akyeh (2021) and Shree Bhagwati (2016). Thus, there appears to be an empirical gap in the pharmaceutical sustainable supply chain phenomenon within emerging economies. In an emerging economy such as Ghana, assessing the impact of the pharmaceutical industry on the environment has not been extensively done (Zahiri et al. 2017a). Furthermore, the empirical literature on assessing the role of managers in ensuring pharmaceutical sustainable supply chain practices is limited and non-existent in some instances in Ghana according to Muñoz-Torres et al. (2020); Thorlakson et al. (2018). Global pharmaceutical supply chains involve disseminating knowledge to local firms in emerging economies, an underexplored domain. The existing literature on the impact of local and global SSCM practices on sustainability is limited. Empirical research on SSCM practices in underdeveloped economies like Ghana is scarce. Most research are from wealthy nations, leaving a vacuum in understanding resource-constrained difficulties and adoption patterns in countries such as Ghana as suggested by Asamoah, Nuerterey, Agyei-Owusu & Akyeh (n.d.) Thus, manufacturing companies are faced with few empirical data on how to leverage on sustainable practices to meet global demand for pharmaceutical products. The role of stakeholders, such as local communities, non-governmental organizations, and governments, in shaping SSCM practices within the pharmaceutical sectors of developing economies remains uncertain. Clarifying these dynamics

is essential for achieving sustainable growth (Siems, Seuring & Schilling, 2023).

These knowledge gaps present an opportunity to explore the effects in determining the existence, practice, use and level of adoption of sustainable supply chain management practices within the pharmaceutical industry especially in developing economies. This study therefore intends to understand how supply chain management practices and processes in the upstream pharmaceutical industry affect sustainability issues (social, environmental and economic) within the pharmaceutical manufacturing sector in developing economies like Ghana

### **1.5 Aim of the study**

The overall aim of this research is to assess the Sustainable Supply Chain management practices within upstream of the pharmaceutical industry in Ghana.

### **1.6 Objectives of the study**

The objectives, stated below, provide guidance and direction in achieving the primary aim of the research. Thus, at the end of this study, the following objectives would have been achieved:

1. To identify the sustainable supply chain management practices in the upstream of the pharmaceutical industry in Ghana.
2. To evaluate the sustainable supply chain management policy framework in the upstream of the pharmaceutical industry in Ghana.
3. To identify how sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana.
4. To examine the role of top management in ensuring supply chain management practices in the upstream of the pharmaceutical industry in Ghana

### **1.7 Research questions**

The following research questions (RQ), emanating from the specific objectives, will guide the thesis and be answered at the end of the research.

**RQ1:** What is the state of sustainable supply chain management in the upstream of the pharmaceutical industry in Ghana?

**RQ2:** What is the role of policy framework for the adoption of Sustainable Supply Chain Management practices on performance?

**RQ3:** How does supply chain management practices in the upstream of the pharmaceutical industry in Ghana influence performance?

**RQ4:** How does top-management ensure Sustainable Supply Chain Management practices are implemented to enhance performance in the upstream pharmaceutical industry of Ghana?

### **1.7 Significance of the Study**

The study on Sustainable Supply Chain Management (SSCM) practices in the upstream pharmaceutical industry of Ghana holds significant implications for the pharmaceutical industry, policy direction, and academia. In addition, this study will stimulate further discussion and promote academic debate in the area of leadership and supply chain in the Ghanaian context, which will burgeon policy directions for the pharmaceutical industry for sustained growth and development.

The outcomes of the study, thus, offers guidelines for managers, particularly in the pharmaceutical manufacturing sector of Ghana. Firstly, for the upstream pharmaceutical industry of Ghana, there is the need to comprehend the level of adoption and implementation of sustainable practices, identify areas of improvement and highlight best practices of their SSCM practices within the organizations. The findings of this study provide valuable insights into the current state of SSCM practices within the industry. By assessing the level of adoption and implementation of SSCM, the study assists in identifying areas of improvement and highlight best practices. This knowledge will enable pharmaceutical companies in Ghana and beyond to enhance their supply chain operations, improve their environmental and social performance, and to meet the growing expectations of stakeholders and consumers. The study also shed light on the role of top management in driving sustainable supply chain practices, emphasizing the need for leadership commitment and involvement in implementing SSCM initiatives.

Secondly, the study informed policy direction in the pharmaceutical sector. By examining the role of the upstream pharmaceutical policy framework on SSCM, the research provided recommendations for policy enhancements and regulatory measures. Policymakers could leverage on the study's findings to develop and enforce regulations that promote sustainable practices, encourage collaboration between industry stakeholders, and address environmental and societal concerns. The study contributed to the development of a supportive policy environment that aligns with global sustainability goals and ensures the long-term viability of the pharmaceutical industry.

Lastly, the study holds academic significance by filling the existing empirical gap in the understanding of SSCM practices within the pharmaceutical industry, particularly in emerging economies such as Ghana. The research contributed to the body of knowledge on sustainable supply chain management by providing insights specific to the pharmaceutical sector. The study's mixed-method approach, incorporating both quantitative and qualitative analysis, can serve as a valuable reference for future academic research in the field. Additionally, the study stimulated further discussion and academic debate on the role of leadership, policy frameworks, and performance outcomes in the context of SSCM practices. The findings and recommendations of the study can also guide future researchers and scholars interested in exploring the link between sustainability, supply chain management, and the pharmaceutical industry.

In summary, the study's significance lies in its potential to improve supply chain practices, inform policy decisions, and contribute to academic research within the pharmaceutical industry. The findings can assist companies in adopting sustainable practices, guide policymakers in formulating effective regulations, helps in creating awareness of sustainability issues and provide valuable insights for academia to expand the knowledge base on SSCM practices.

### **1.9 Scope and delimitation**

The scope of the study is to assess and examine the SSCM practices in the upstream pharmaceutical industry of Ghana. The research aims to understand the state of SSCM practices, the role of the policy framework, the influence of SSCM practices on company performance, and the role of top management in ensuring sustainable supply chain management practices.

To address these objectives, the study investigated research questions related to the state of SSCM practices, the role of policy framework, the influence of SSCM practices on performance, and the role of top management. Hypotheses was formulated to test the relationships between SSCM practices, top management commitment, and performance outcomes. The research findings contribute to the understanding of sustainable supply chain practices in the pharmaceutical industry of Ghana, filling the existing empirical gap. The study stimulated further discussion and academic debate, informing policy directions for sustainable growth and development in the pharmaceutical sector.

There were approximately 38 pharmaceutical upstream pharmaceutical industry in Ghana at the time of this study. However, this study was limited to the pharmaceutical manufacturers in Ghana, organized under the umbrella of the Pharmaceutical Manufacturers Association of Ghana (PMAG). Within PMAG, the research was limited to upstream pharmaceutical companies in the Greater Accra Region of Ghana. Numerous scholars have put forth diverse models, such as the Triple Bottom Line (TBL), Resource-Based View (RBV), and institutional theory. This research focuses on upper echelon theories and the level of commitment exhibited by top management. Overall, the scope of the study encompassed assessing SSCM practices, examining the policy framework, exploring the influence on performance, and investigating the role of top management in the upstream pharmaceutical industry of Ghana.

### **1.10 Research Methodology**

The study used the mixed method to understand pharmaceutical sustainable supply chain management practices. The research in question adopted pragmatism as research philosophy, which focuses on both objective observation and measurement, as well as incorporating subjective judgment of the researcher through experience and expertise. The research design chosen was concurrent/parallel mixed method, specifically utilizing both explanatory and exploratory designs. The research approach includes a deductive approach, where hypotheses were formulated based on existing theories, as well as an inductive approach, which is used when there is no prior theory or literature on the topic. It was made up of data collection through questionnaires and interviews to gather insights from the manufacturing companies within the pharmaceutical industry in Ghana. The study focused on the upstream pharmaceutical industry, specifically the manufacturers operating within Ghana.

The target population for this study were employees of locally owned upstream pharmaceutical companies in Ghana, specifically those involved in procurement and supply chain activities. The sampling method employed was stratified random sampling, ensuring representation from small, medium, and large companies. Additionally, purposive sampling was used to select top executives and public officials for interviews.

The measurement instrument includes structured questionnaires and structured interview guide. The questionnaires were designed to understand the nature, scope, and practices of upstream pharmaceutical sustainable supply chain management. The structured interview guide was used

to gather expert opinions on Ghana's pharmaceutical sustainable supply chain practices from top executives and officials of public sector institutions. Data collection involved distributing online google form questionnaires and conducting in-person structured interviews. For the quantitative aspect, data was analyzed using structural equation modelling. Thematic analysis and content analysis were employed for qualitative analysis.

Validity and reliability were ensured through various measures. The structure questionnaires were designed based on existing literature and reviewed by experts to establish face validity. The reliability of the measurement instrument was assessed using the Cronbach's alpha coefficient. For the qualitative aspect, trustworthiness was achieved through member checking and expert peer review. Ethical considerations were given priority in this study. Informed consent was obtained from all participants, and anonymity and confidentiality were maintained. Participants had the option to withdraw from the study if they felt coerced or uncomfortable on any aspect of the research instruments.

Overall, the study investigated the impact of sustainable supply chain management practices on performance outcomes in the upstream pharmaceutical sector in Ghana. The adoption of a Pragmatist research philosophy, mixed research design, and rigorous validity and reliability measures ensure the robustness of the study. Ethical considerations were upheld throughout the research process to protect the rights and well-being of participants.

### **1.11 Research Structure**

This thesis comprises seven chapters. The first chapter is the introduction. The chapter provided the background of the thesis, the statement of the research problem, and the research objectives. The questions, which emanated from the research objectives, were also presented. It further explained the significance of the research, and the scope and limitations of the study. The rest of the chapters of the thesis are organized as follows:

### **Chapter 2: Conceptual and Theoretical Review**

Conceptual and theoretical review chapter delves into the conceptual issues relating to pharmaceutical supply chain, sustainable supply chain management, some historical antecedents of sustainable supply chain management, upstream pharmaceutical sustainable supply chain management, and upstream pharmaceutical policy framework. Empirical review divided into global and Ghana perspectives are also provided. The chapter also reviewed the

literature on the basis of the objectives of the study. The final section provided a thorough discussion of the theory that underpin the study and explained how the theory is related to the concepts.

### **Chapter 3: Empirical and Hypotheses Development**

This chapter focused on the research framework and provided empirical evidence and support for the relationship between the constructs under study and how the hypotheses were developed. The review is guided by the research objectives and the research questions. The chapter also explained the key variables used in the study. The conceptual model was presented and described in the chapter's final section.

### **Chapter 4: Research Methodology**

This chapter presented the methodological approach used to conduct the research. It provided information on the research approaches, the sampling design, and the research instruments, research philosophy, research design, research approach, research methods, population, sample techniques and data collection instruments as well as data collection plan, reliability and validity issues, anonymity and confidentiality, and ethical consideration. It also provided information on how both the quantitative and qualitative data were collected. In addition, it provided details on using structural equation modelling and thematic analysis and content analysis both the quantitative and qualitative data, respectively. The ethical considerations and data quality are also discussed.

### **Chapter 5: Results and Discussion**

This chapter brings to bear the data analysis, results and discussions of the research carried out. By employing visual aids like graphs, charts, and tables, the researcher conveyed the findings and results more effectively after doing an analysis of the data that was gathered. The findings and outcomes were presented in relation to the research questions and the reviewed literature.

### **Chapter 6: Summary of Findings and Contribution**

Findings of the study is presented in this chapter. Findings were presented in accordance to the research objectives and hypotheses developed in Chapter one of the study. The chapter

discusses the researcher's results and determines if the study fully addressed the research questions as they had been established. Advancements were also made in theory, management, and policy.

## **Chapter 7: Conclusions and Recommendations**

The last chapter concludes on the various issues discussed, the findings made, focus is given to sustainable supply chain management (SSCM), performance outcomes, and role of top management in driving the adoption and attainment of sustainable supply chain management performance (SSCMP). Recommendations were made in respect to adoption of sustainable supply chain management (SSCM), top management commitment, and recommendation for future studies. The chapter also detailed the specific contributions of the research by providing the theoretical and managerial research implications of the study, after which it presented the limitations of the research and directions for future studies.

### **1.12 Chapter Summary**

Chapter 1 provides an introduction and background to the study on Sustainable Supply Chain Management (SSCM) practices in the upstream pharmaceutical industry of Ghana. The chapter highlights the significance of the research, identifies the research context, presents the research problem, and outlines the aim and objectives of the study. The background section emphasizes the importance of sustainable practices in the pharmaceutical industry, considering the global responsibility of manufacturing and distributing medications. The research problem identified is the low adoption of SSCM practices in the upstream pharmaceutical industry, particularly in emerging economies like Ghana. The lack of empirical research and data on SSCM practices in the pharmaceutical industry of Ghana is highlighted, along with the limited understanding of the role of top management in driving sustainable supply chain practices. The aim and objectives of the study were then presented, focusing on assessing the state of SSCM practices, examining the role of the policy framework, investigating the influence of SSCM practices on performance, and exploring the role of top management in ensuring sustainable supply chain practices. Overall, Chapter 1 provides a comprehensive overview of the research topic, establishing the background, research problem, aim, objectives, research questions, scope, and methodology of the study. It sets the foundation for the subsequent chapters, which delve deeper into the conceptual and theoretical review, empirical and hypotheses development, methodology, results and discussions, and conclusions and recommendations. The next chapter

presents a conceptual and theories discussing the influence of Sustainable Supply Chain Management (SSCM) practices in the upstream pharmaceutical industry of Ghana.

## CHAPTER TWO

### CONCEPTUAL AND THEORETICAL REVIEW

#### 2.1 Introduction

The previous chapter introduced and gave the background to the study, as well as emphasizing the significance of the study. This chapter provided the overview of literature surrounding the topic of Sustainable Supply Chain Management practices (SSCM). The primary aim of this Chapter was to review the relevant literature to provide the conceptual background regarding the research phenomenon. The chapter was broadly divided into three thematic areas: conceptual review, empirical review and theoretical review. The chapter serves as the foundation for the research on pharmaceutical supply chain sustainability. It aligns with the study objectives of identifying upstream pharmaceutical Sustainable Supply Chain Management practices in Ghana, assessing the impact of Ghana's policy framework on supply chain sustainability, analyzing pharmaceutical companies' performance, and exploring top management's role in sustainability. Delving into specifics such as upper echelon theories, Sustainable Supply Chain Management (SSCM) practices, the Triple Bottom Line (TBL), the Supply Chain Operations Reference model (SCOR) Model, historical SSCM antecedents, and Pharmaceutical Supply Chain Management, this chapter provides essential context to the study.

#### 2.2 Conceptual Issues

The conceptual review of this dissertation provides an in-depth examination of the fundamental ideas and concepts on the subject of sustainable supply chains in the pharmaceutical sector, sustainable supply chain management, upstream pharmaceutical sustainable supply chain management, upstream pharmaceutical policy framework, and SCOR. The conceptual review synthesizes existing literature and ideas related to the topic, rather than focusing on empirical research findings. It provided a comprehensive understanding of key concepts and models, sustainable supply chain management and performance. The next section provides the conceptual issues relating to pharmaceutical supply chain, supply chain and sustainable supply chain management.

##### 2.2.1 Background to Pharmaceutical Supply Chain

The pharmaceutical supply chain refers to the process of getting prescription drugs to patients (Omoush, Mohammad & Faculty 2020; Ding 2018). Pharmaceutical products are manufactured and transferred to wholesale distributors before being stocked in retail, mail-order, and other

types of pharmacies (Sood, Mulligan & Zhong 2021; Papalexi, Bamford & Breen 2020; Chen, Yang & Wang 2019). They are then subjected to price negotiations and processed through quality and utilization management screens by pharmacy benefit management companies before being dispensed by pharmacies and finally delivered to and taken by patients (Ouf 2021; Papalexi et al. 2020). Because the stakeholders in the supply chain are always evolving, and commercial ties vary significantly by area by the type of medication and other criteria, there are many variants on this basic framework (Ouf 2021; Papalexi et al. 2020).

The particular architecture of the pharmaceutical supply chain makes handling complex information for supply chain effectiveness difficult, but the benefits are undeniable. Poor inventory control procedures may result from a lack of effective information mechanisms, which can affect transportation costs (Papalexi et al. 2020; Ding 2018; Shree Bhagwati 2016). In the pharmaceutical supply chain, pharmaceutical manufacturers are the source of prescription medications. Manufacturers of brand-name pharmaceuticals and generic drugs (e.g., Pfizer, Merck, and Novartis) make up the pharmaceutical manufacturing sector. The majority of branded pharmaceutical companies invest a portion of their budget to scientific research and the development of novel pharmacological therapies (Ding 2018; Shree Bhagwati 2016). Manufacturers oversee drug distribution from manufacturing facilities to drug wholesalers, and in some circumstances, retail pharmacy chains, mail order and specialty pharmacies, and hospital chains (Sood et al. 2021; Chen et al. 2019; Shree Bhagwati 2016). The involvement of multiple intermediaries and distribution channels, each with its own practices and regulatory requirements, complicates supply chain management and makes achieving effective SSCM challenging in the pharmaceutical industry.

Literature has demonstrated importance of top management commitment within organizations and how this leads to several gains within the organization (Ahmed, Manaf & Islam 2021; Siagian, Jiwa & Tarigan 2021). Practically, the top management theory and upper echelon theory provide some underpinnings to why top management are important to ensuring that strategy adoption and implementation, and overall organizational performance increases within an organization (Dubey, Altay, et al. 2018). The pharmaceutical industry is a global organization that is responsible for manufacturing and distribution of medications to a country and beyond. Pharmaceutical sustainable supply chain management can be seen in five tiers (primary manufacturing, secondary manufacturing, main and local distribution centers and the final destination zones). SSCM may be considered as the effective and efficient management

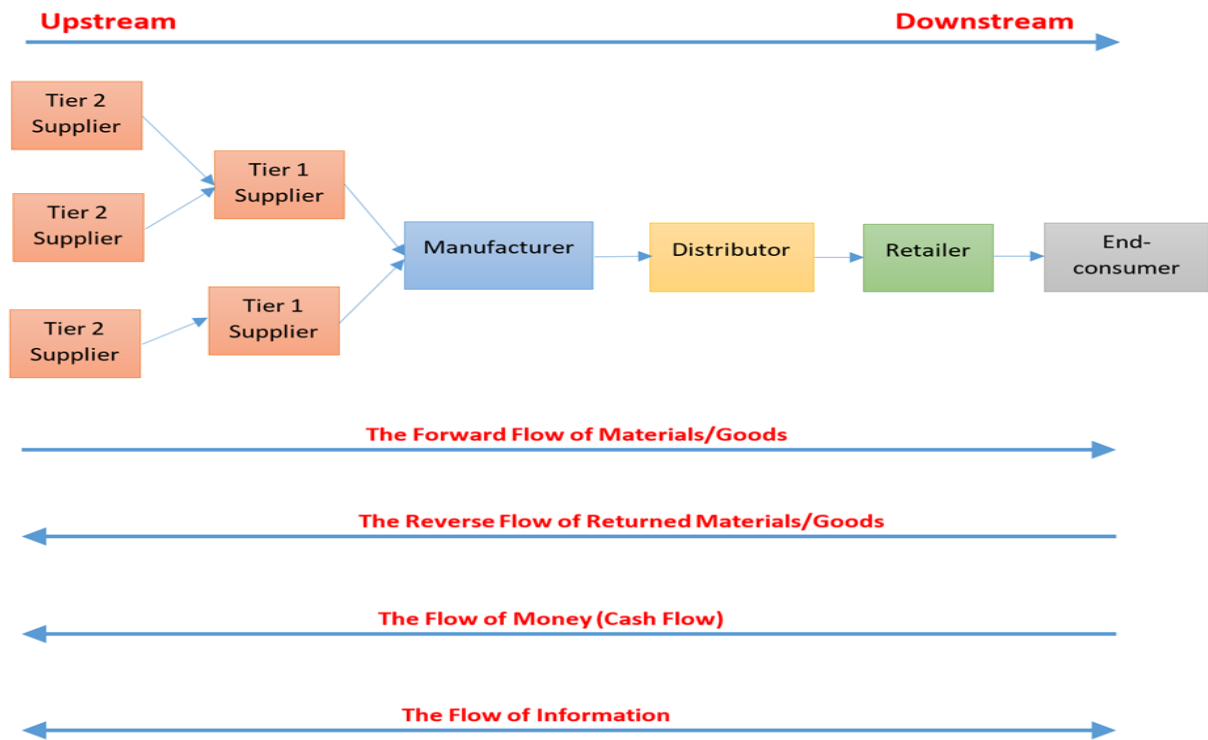
of associated environmental, social, and economic consequences in the construction and maintenance of global supply chains. SSCM promotes governance methods and policy that aim to decrease waste, assure long-term consistency, and economic value of environmental and social well-being for all stakeholders involved in the production and delivery of products and services at all levels of their lifecycles (Muñoz-Torres, Fernández-Izquierdo, Rivera-Lirio, Ferrero-Ferrero & Escrig-Olmedo 2021a; Scholten & Fynes 2017b). Although incorporating the rights and needs of all interested stakeholders in the market system into the decision-making process is a challenging task, it is to the long-term benefit of effectively managing supply chain relationships and corporate sustainability projects that eventually enable broad-based sustainable development objectives for the benefit of people, plants, and profits.

In a study conducted by Jia et al. (2015), SSCM practices identified included supplier compliance auditing, sustainable packaging, designing products with recyclable materials, company-wide environmental audits, environmental safety practices, among others. These practices were further classified as management, supplier, design, internal, and customer. The measurement items that indicate SSCM practices were thought of based on environmental, social, and economic dimensions that could translate into increased performance outcomes (Jia, Diabat & Mathiyazhagan, 2015).

SSCM demonstrates that every business is a component of a larger system that is part of a larger social–natural system (Muñoz-Torres et al., 2021a). This requires collaboration with not just providers, but also receivers, other stakeholders, and managers to shape the relationships between various systems. Managing sustainable supply chain necessitates firstly, identifying the most significant components of environmental and social impact, and then involving individual connections in measures that will mitigate these components' negative effects (Muñoz-Torres et al., 2020; Scholten and Fynes, 2017).

Ensuring that SSCM is met means that manufacturing firms and by large the entire industry is regulated by appropriate bodies in a nation. In Ghana, major manufacturing is centered around electronics, light manufacturing, aluminum smelting, food processing, cement, and small commercial shipbuilding. Food and beverage production, textiles, chemicals and pharmaceuticals, metal and wood processing are among the other sectors (Alhassan, 2021; Bour, Asafo & Kwarteng, 2019). Thus, the pharmaceutical industry must be seen to be protecting the environment, society and people who are used to produce the various drugs into the market. Understanding the streams within the pharmaceutical industry is imperative as efforts are made

to understand what constitutes upstream pharmaceutical sustainable supply chain management. Figure 2.1 presents the five tiers commonly associated with the supply chain applicable to manufacturing industry. They are: primary manufacturing, secondary manufacturing, main and local distribution centers, and the retailer (Adzija & Kukhta 2022).



**Figure 2. 1 Figure 2. 1 The five-tier model of the supply chain**

Source: Adzija and Kukhta (2022)

The five-tier model of the supply chain provides a comprehensive framework for understanding the various stages involved in the creation and delivery of products to end customers. Each tier plays a crucial role in ensuring the smooth flow of materials and products throughout the supply chain. Tier 1 involves primary manufacturing, where raw materials or components are produced, while Tier 2 encompasses secondary manufacturing, where these components are further processed or assembled into finished products. Tier 3 consists of main distribution centers that efficiently receive, store, and distribute goods from Tier 2 manufacturers to specific regions. Tier 4 comprises local distribution centers that manage order fulfillment and last-mile delivery, while Tier 5 represents the end customers or retail locations where the final products are consumed or sold (Christopher, 2016). This tiered structure highlights the complexity and coordination required for pharmaceutical industry.

It is important to note that the specific configuration and terminology of supply chain tiers can vary depending on the industry, product type, and organizational structure. The five-tier model provides a general framework to understand the different stages and entities involved in the supply chain, from raw material production to the end customer. In Ghana, the Pharmacy Council plays an important role in regulating the production, distribution and supply of drugs and medical products within the country. Again, access to necessary medications for everyone, quality assurance for all pharmaceuticals on the market, a functioning and efficient supply chain, and sensible use of medicines by professionals and patients are the main aims of Ghana's pharmaceutical policy. In the national health policy, there is also a commitment to enhance the domestic pharmaceutical sector, which is detailed under health industry. The overall legal framework for the pharmaceutical sector is set by the Food and Drugs Law from 1992, amended by Act 523 in 1996. It defines the role of the food and drugs board as separate entity under control of the Ministry of Health (MOH), responsible for regulating the sector. The Pharmacy Council is a statutory body established by an Act of Parliament. The Health Professions Regulatory Bodies Act (Act 857) regulates the practice of Pharmacy in Ghana. Therefore, ensuring that pharmaceutical companies comply with operational standards and sustainable measures is the sole responsibility of the Pharmacy Council Ghana as supported by the Ministry of Health and the Ghana Health Service.

Managers of manufacturing firms and specifically pharmaceutical companies have a role to play when it comes to ensuring that supply chain undertakes sustainable measures. Top Management Commitment to attaining increased performance outcomes has been identified in extant literature (Ahmed et al., 2021; Siagian et al., 2021). Top management commitment is regarded as essential to management initiatives. Top management facilitates employee empowerment, improved levels of job, and adherence to industry standards. The concepts of Supply chain management (SCM) and SSCM are explained in the subsequent sections.

### **2.2.3 Supply chain management (SCM)**

Supply chain management (SCM) is defined as the systematic, strategic coordination of traditional business functions and tactics across these business functions within a company and across businesses within the supply chain, with the goal of improving the long-term performance of individual companies and the supply chain (Fritz, 2019). Handfield and Nichols (1999) defines supply chain management in this way:

*“Supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements.”*

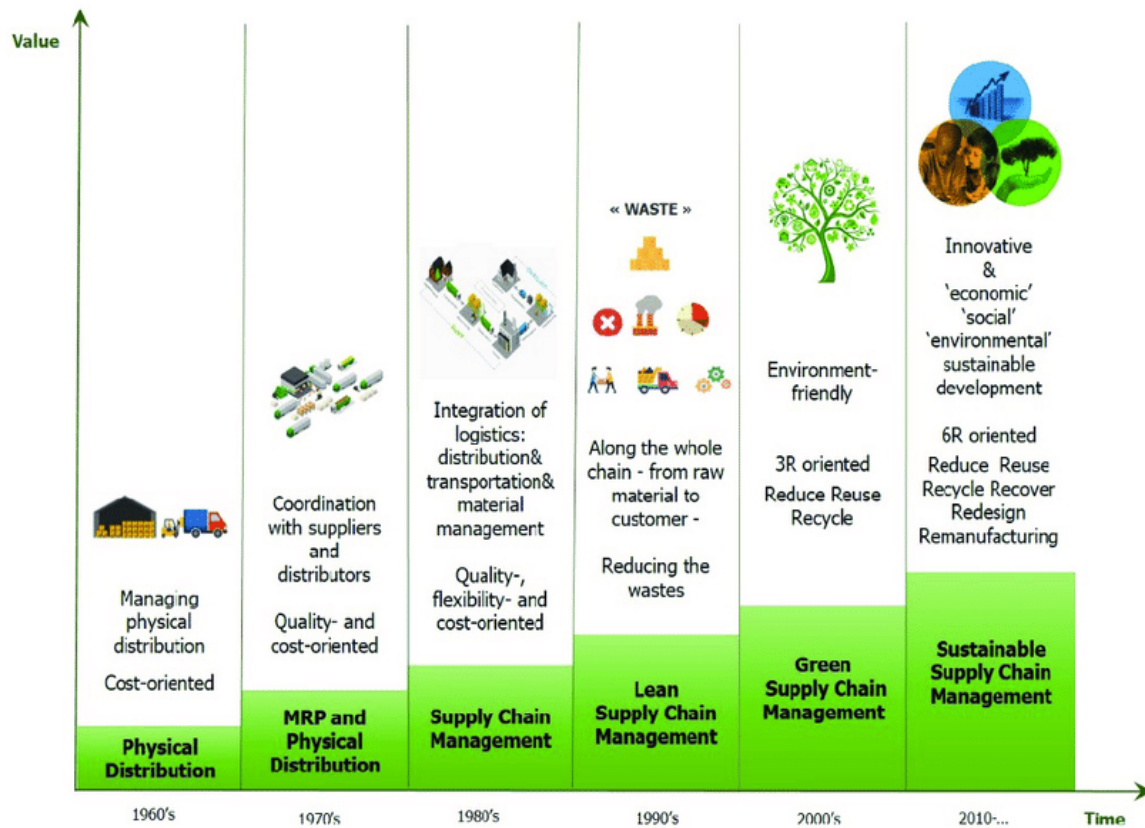
The management of the flow of products and services is a component of SCM, which encompasses all processes that turn raw materials into completed commodities (Langley, Novack, Gibson & Coyle, 2020; LeMay, Helms, Kimball & McMahon, 2017). SCM comprises a company's supply-side activities being purposefully simplified in order to increase customer value and achieve a competitive edge in the market (Mukhamedjanova, 2020; Copacino, 2019). Supply chain management includes product creation, sourcing, production, logistics, and the information systems needed to coordinate these operations (Xu & Zhao, 2022a; Mukhamedjanova, 2020; Mangan & Lalwani, 2016). SCM is carried out to boost customer value and establish a durable competitive advantage (Mukhamedjanova, 2020). SCM is based on the idea that practically all marketed items are the result of the labour of several businesses that are linked together by a supply chain. Supply chains have existed for a very long time, but most companies have only lately realized the value it can offer to their operations (Mukhamedjanova, 2020; Hong et al., 2018; Truong et al., 2017). SCM is a discipline focused on optimizing the flow of goods, services, and information from suppliers to end customers. It aims to streamline operations and enhance operational efficiency (Chopra & Meindl, 2019). The core principles of SCM include efficiency enhancement, cost reduction strategies, a customer-centric focus, global expansion enablement, technological advancements, and innovation, as well as gaining a competitive edge (Chopra & Meindl 2019; Mavengere 2013). Efficiency enhancement is a key objective of SCM, aiming to minimize delays, reduce inventory levels, and optimize resource utilization (Chopra & Meindl, 2019). Cost reduction strategies in SCM include adopting just-in-time inventory systems and efficient transportation routing, leading to decreased inventory holding costs and more efficient logistics operations (Aini Othman, Pandiyan Kaliani Sundram, Mohamed Sayuti & Shamsul Bahrin, 2016; Christopher, 2016). SCM also focuses on customer satisfaction by ensuring the availability of products when and where customers demand them, fostering positive customer relationships and brand loyalty (Adam, Ibrahim, Ikramuddin & Syahputra, 2020). Additionally, SCM enables organizations to expand globally by facilitating access to diverse markets and enabling cost-effective global sourcing of materials and products (Yu, Razon & Tan 2020; Mangan &

Lalwani, 2016). Technological advancements play a crucial role in SCM, with the integration of technologies such as the Internet of Things (IoT), blockchain, and data analytics providing real-time visibility into supply chain operations and enhancing decision-making and risk management (Christopher, 2016). Organizations that excel in SCM gain a competitive edge by offering superior quality, shorter lead times, and competitive pricing (Chopra and Meindl, 2016). SCM is a cornerstone of modern business operations, continuously evolving to meet the dynamic demands of today's interconnected world (Chopra and Meindl, 2016).

In summary, SCM is a pivotal discipline in contemporary business operations, focused on optimizing the flow of goods, services, and information. It aims to enhance operational efficiency, reduce costs, satisfy customers, enable global expansion, drive technological innovation, and provide a competitive advantage. SCM is essential for organizations seeking to thrive in an interconnected and competitive marketplace.

### **2.2.2 Brief Historical Development of Supply Chain Management**

After establishing the theoretical groundwork of SCM in the preceding section, this portion shifts its focus towards sustainability and introduces the concept Sustainable Supply Chain Management (SSCM). The discussion highlights how SCM has transitioned from primarily addressing economic and operational aspects to encompassing a broader spectrum of social, economic, and environmental concerns within a firm's supply chain (Carter & Easton, 2011). This transformation is motivated by various isomorphic drivers and pressures compelling traditional supply chains to be more socially and environmentally responsible (Diabat & Govindan, 2011). Figure 2.2 illustrates this evolution, depicting the progression of SCM towards sustainability and the emergence of SSCM. The figure provides a summarized overview of the historical development of SCM from its roots in the physical distribution approach of the 1960s to its current state.



**Figure 2. 2 Historical developments of Supply Chain Management.**

Source: Bilgin (2021)

The concept of Sustainable Supply Chain Management (SSCM) has evolved from traditional supply chain management (SCM) by incorporating social, economic, and environmental dimensions (Carter, Hatton, Wu & Chen, 2020). This shift is driven by various factors, including environmental concerns, regulations, customer awareness, and the need for resilience in the face of events like the COVID-19 pandemic (Ambrogio, Filice, Longo & Padovano, 2022; Sarkis, 2021; Carter et al., 2020). Globalization has also emphasized the importance of sustainable practices in complex supply chains. As firms reconceive their supply chains, they are embracing a broader sense of responsibility towards social and environmental issues, making sustainability a central focus in SCM (Ambrogio et al., 2022; Sarkis, 2021). Table 2.1 illustrates the evolution of SCM towards sustainability and the emergence of SSCM.

**Table 2. 1 The evolution of SCM towards sustainability**

Time Period	SCM Evolution Phases	Key Drivers
Pre-1990s	Traditional SCM (Pre-1990s)	In this phase, SCM primarily focused on economic and operational aspects within a firm's supply chain.
1990s	Integration and Quality Focus (1990s)	Regulatory Pressures, During the 1990s, there was an emphasis on integrating various supply chain components and improving product quality.
Early 2000s	Environmental Concerns (Early 2000s)	The early 2000s marked a shift as environmental issues associated with supply chains, such as pollution and waste, gained attention.  Changing Consumer Expectations
Mid-2000s	Social and Ethical Considerations (Mid-2000s)	In the mid-2000s, social and ethical issues within supply chains, including labor conditions, gained prominence. Resource Scarcity
Late 2000s	Sustainability and Triple Bottom Line (Late 2000s)	Towards the late 2000s, supply chain management evolved to incorporate sustainability principles, considering economic, social, and environmental impacts. Social Issues

2020s	COVID-19 Pandemic (2020s)	The COVID-19 pandemic further emphasized the need for resilient and adaptable supply chains. Economic Considerations
-------	---------------------------	--

Source: Author's Construction (2023)

The shift toward sustainability in supply chains has transformed significantly over time due to environmental and societal changes (Bilgin, 2021). Initially, businesses primarily focused on mass production through traditional methods (Madu, 2023; Fritz, 2019). However, this approach led to severe environmental problems like pollution and waste, causing broader negative impacts such as acid rain and global warming (Asif, 2022; Raju, Sarkar, Singla, Singh & Sharma, 2016). As societies became more affluent, customer expectations grew, demanding better quality and environmentally friendly products (Carter & Easton, 2011). This transition from industrial systems centered on mass production and economic goals to post-industrial systems emphasizing environmental and social concerns laid the foundation for the shift to SSCM (Carter & Rogers, 2008).

The shift towards SSCM was significantly influenced by the increasing demand on natural resources due to global population growth (Govindan, 2018). Governments responded by implementing environmental regulations on supply chains, recognizing their direct impact on the environment (Sarkis, 2021). SSCM entails integrating sustainable practices throughout supply chains, encompassing procurement, manufacturing, product stewardship, distribution, and reverse logistics (Sánchez-Flores, Cruz-Sotelo, Ojeda-Benitez & Ramírez-Barreto 2020). However, despite growing interest and efforts to implement SSCM, challenges like complexity, costs, and lack of understanding persist (Cristini, Zerbini & Salvietti, 2021). This discussion emphasizes the historical progression and factors driving the sustainability shift in supply chains (Hsu, Hwang & Chiu, 2021). It highlights the significance of SSCM in addressing environmental and social concerns, recognizing the hurdles that still need to be overcome (Hsu et al., 2021; Sarkis, 2021). Additionally, it paves the way for further research into SSCM within the pharmaceutical manufacturing sector of Ghana, acknowledging the unique challenges and opportunities presented in this context (Brandenburg & Rebs, 2015). The evolution of sustainability within supply chains has been a transformative journey, driven by evolving consumer expectations, regulatory pressures, and heightened awareness of environmental and

social issues. This brief discussion explores the significant milestones in this evolution and their implications, from early environmental awareness to the current era of technology-driven sustainability efforts.

The movement towards sustainable supply chains through the adoption of regulatory initiatives began in the mid-20th century when people started realizing the impact of environmental and social issues. However, it gained significant momentum in the 1970s with the introduction of environmental regulations such as the Clean Air Act and Clean Water Act in the United States (Hunter & Waterman, 2016). These regulations were crucial in urging businesses to consider and address environmental concerns. In the 1980s and 1990s, Rise of Corporate Social Responsibility (CSR) emerged as a powerful force driving sustainability in supply chains (Phillips, Schrempf-Stirling & Stutz, 2020; Latapí Agudelo, Jóhannsdóttir & Davídsdóttir, 2019). Companies started understanding that it was not just about following regulations but being proactive in addressing social and environmental issues. During this period, influential works such as "The Triple Bottom Line" by John Elkington were published, introducing the concept of people, planet, and profit (Elkington ,1997). The 21st century witnessed a remarkable shift fueled by consumer awareness. With easy access to information through the internet and social media, consumers began demanding transparency and ethical sourcing. This shift aligned with the globalization of supply chains, compelling businesses to uphold ethical and sustainable practices across borders (Handfield, Jeong & Choi, 2019). Over time, sustainability in supply chains transformed from a mere charitable activity to a strategic necessity. Businesses started incorporating sustainability metrics into their key performance indicators (KPIs). Measurements such as carbon footprint, water usage, and fair labour practices became standard ways to evaluate supply chain performance (Carter & Rogers, 2008).

In modern times, the circular economy idea became more prevalent, focusing on using resources efficiently and reducing waste. Technology, such as blockchain and the Internet of Things (IoT), played a significant role in enhancing transparency and traceability within supply chains, promoting sustainable practices (Raja, 2021; Rejeb, Keogh & Treiblmaier, 2019). The outbreak of the COVID-19 pandemic laid bare the vulnerabilities in global supply chains, prompting a thorough re-evaluation of resilience and sustainability. Companies began reconsidering the geographic dispersion of their suppliers and recognizing the necessity of diversified sourcing to mitigate risks (Sarkis, 2021).

In summary, the transformation of sustainability in the supply chain represents a transition from merely adhering to regulations to strategically integrating sustainability. This shift has been influenced by evolving consumer demands, regulatory mandates, globalization, and advancements in technology. Presently, sustainability within the supply chain is more than a trendy phrase; it is a core element of business strategy, crucial for enhancing resilience, building a positive reputation, and ensuring long-term success.

### **2.2.3 Sustainable Supply Chain management (SSCM)**

The image of a modern supply chain has become inseparably associated with its care for ecological aspects and sustainable development (Tajri & Chafi, 2019; Ding, 2018). It can be assumed that the pursuit of sustainable supply chain management results from the needs of the modern world. The need for efficiency and care for natural resources contribute not only to improving the image but also to waste reduction, innovation, generating profits, and building a competitive advantage (Tyan, Moheno, Carolina Pérez Hernández, Zimon & Sroufe, 2020). Implementing sustainable solutions in logistics processes will not only help the environment and improve the image of the organization, but it can also give enterprises financial benefits (Tyan et al., 2020).

SSCM promotes governance methods and policy that aim to decrease waste, assure long-term consistency, and economic value of environmental and social well-being for all stakeholders involved in the production and delivery of products and services at all levels of their lifecycles (Ambrogio et al., 2022; Carter et al., 2020). Although incorporating the rights and needs of all interested stakeholders in the market system into the decision-making process is a challenging task, it is to the long-term benefit of effectively managing supply chain relationships and corporate sustainability projects that eventually enable broad-based sustainable development objectives for the benefit of people, plants, and profits.

SSCM takes into account environmental, economic and social influences and implements friendly manufacturing practices throughout the product life cycle. These practices, according to Sroufe and Melnyk (2017), include stakeholder engagement, materials selection and sourcing, product/process design, life cycle assessment (LCA), manufacturing processes, transportation of final products and services to consumers, as well as product end-of-life management and closed-loop systems (Tyan et al. 2020).

Excellent supplier relationships result in reduced environmental and social risks, which is especially crucial in building a sustainable supply chain (Tyan et al., 2020; Nieuwenhuis, Touboulic & Matthews, 2019). To become sustainable, supply chain integration is key within the operational space of manufacturers and other members of the supply chain (Fritz 2019; Nieuwenhuis et al., 2019; Ding, 2018). Modern supply chains should implement sustainable solutions, not for economic, but moral reasons. The key to building a sustainable supply chain is to find alignment between economic and environmental issues (Tyan et al., 2020).

SSCM is the management of supply chains (SC) in a way that integrates the sustainability objectives and requirements defined by the firm, suppliers, customers, and external stakeholders (e.g., consumers, policymakers, associations) (Cristini et al., 2021; Ding, 2018). These sustainability objectives include economic, social, environmental, and ethical targets that all members of the supply chain must reach in order to make the supply chain sustainable (Fritz, 2019).

So far, there has been no agreement on how to define the phrase "sustainable supply chain management" (Fritz 2019). It is necessary to provide a clear definition of this concept, which is widely used in this study. The World Commission on Environment and Development (WCED) (1987, p.8) has presented the most often quoted and most adopted definition of sustainability:

*“Development that meets the needs of the present without compromising the ability of future generations to meet their needs.”*

While SCM is a well-established field of research, for instance, in transportation, network management, or demand planning, this is less the case of SSCM. (Islam, Sarker, Hossain, Ali & Noor, 2020; Tyan et al., 2020). To define SSCM, most of the scientific work on SSCM refers to the Brundtland report often defined with reference to the three pillars of sustainability introduced by the World Commission on Environment and Development's (WCED) 1987 report: economic, social, and environmental (WCED 1987) or the triple bottom line (TBL) coined by Elkington (1997) and Carter & Rogers (2008) who gave the most quoted definitions of SSCM. Since SSCM is a concept originating from industrialized countries, with a rising interest in research and practice starting from the late 2000s, SSCM has long been associated with cost reduction and environmental performance of firms and their SC partners (Islam et al., 2020; Sánchez-Flores et al., 2020b). Indeed, social issues were less of a matter in such

economies where topics such as child, forced labor, or slavery are expected nowadays not to exist anymore (Alzoubi, Ahmed, Al-Gasaymeh & al Kurdi, 2020; Sánchez-Flores et al., 2020b). Consequently, confusion is common between terms such as green supply chain management (GSCM) and SSCM (Acquah, Agyabeng-Mensah & Afum, 2021; Ilyas, Hu & Wiwattanakornwong, 2020). In this entry, GSCM will be used to refer only to environmental performance of SC, while SSCM will be used to refer to the economic, environmental, and social performance of SC. In this sense, SSCM can be defined as the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements (Fritz, 2019).

In a study conducted by Jia et al. (2015), SSCM practices identified included supplier compliance auditing, sustainable packaging, designing products with recyclable materials, company-wide environmental audits, environmental safety practices, among others. These practices were further classified into areas such as management, supplier, design, internal, and customer. The measurement items that indicate SSCM practices were thought of based on environmental, social, and economic dimensions that could translate into increased performance outcomes (Jia et al., 2015).

SSCM demonstrates that every business is a component of a larger system that is part of a larger social–natural system (Muñoz-Torres et al., 2018). This requires collaboration with not just providers, but also receivers, other stakeholders, and managers to shape the relationships between various systems. Managing a sustainable supply chain necessitates first identifying the most significant components of environmental and social impact, and then involving individual connections in measures that will mitigate these components' negative effects (Fritz, 2019; Hong et al., 2018).

SSCM can be considered as an overarching term including, but not limited to, reverse logistics and GSCM, although there is currently no agreement on the definition (Ilyas et al., 2020; Diaz et al., 2015). One issue in SSCM is that research and practice often restrict sustainability to green practices and undermine the social dimension of sustainability (Acquah et al., 2021; Ilyas et al., 2020). With the rise of global trade activities and the related SC risks from financial, social, and ecological perspectives, SSCM has become essential (Nieuwenhuis et al., 2019;

Scholten & Fynes, 2017c). The ability of an organization to effectively manage these provides an opportunity to improve on long-term their economic performance.

Like GSCM, SSCM consists of integrating sustainability at the different SC stages, i.e., product design, purchase, manufacturing processes, packaging, warehousing, transportation, and product take-back operations (Fritz, 2019; Ding 2018; Scholten & Fynes, 2017c). SSCM can be considered as a process integrated along the SC with internal sustainable SC integration, supplier sustainable supply chain integration, customer sustainable supply chain integration, and community sustainable supply chain integration. The notion of SSCM, which encompasses the seamless integration of internal, supplier, customer, and community aspects throughout the supply chain, resonates with the primary objective of this study, which is to comprehend sustainable supply chain practices within the pharmaceutical sector in Ghana. It encompasses the intricate interplay of internal and external integration, meticulously evaluating the profound influence that these practices exert on the overall performance of the company, while simultaneously taking into account the consequential impact on the surrounding local communities. The integrated approach offers a comprehensive framework by which one may evaluate sustainability throughout the entirety of the pharmaceutical supply chain. Before presenting the foundational theory of the study discuss the triple bottom line (TBL) concept and discusses how this theory encourages sustainable practices within the upstream pharmaceutical firms to improve upon organizational performance outcome.

### **2.2.3.1 The Triple Bottom Line (TBL)**

This section provides a brief introduction to the triple bottom line (TBL) concept and its connection to both SSCM practices and SSCM performance. The TBL concept, also known as the three Ps (people, planet, and profit), was developed by Elkington in 1997. Elkington's idea is that an organization's performance can be evaluated through three essential dimensions: social, environmental, and financial. The TBL concept is translated into a framework that aims to simultaneously consider social, economic, and environmental factors from a microeconomic perspective and balance their associated performances (Elkington, 1997).

The TBL framework broadens the scope of organizational performance beyond financial measures to include social and environmental dimensions (Ferraz De Campos, 2017; Slaper, 2011; Elkington, 1997). It encourages sustainable practices, social responsibility, and environmental stewardship and provided a structured approach to evaluate how well a company addresses social, economic, and environmental concerns. In supply chain management,

organizations can integrate TBL principles by considering the social and environmental impacts of their operations alongside financial considerations. This approach promotes responsible and sustainable supply chain practices that benefit society, the environment, and long-term business success (Agrawal, Singh & Murtaza 2016; Gimenez, Sierra & Rodon 2012).

The Green Supply Chain model prioritizes environmental considerations in supply chain management (Khan et al., 2021; Balasubramanian & Shukla, 2017). It entails adopting sustainable practices, including reducing carbon emissions, minimizing waste generation, promoting eco-friendly packaging, and sourcing from environmentally responsible suppliers (Veleva, Cue, Todorova, et al., 2018; Jabbour & De Sousa Jabbour, 2016). The objective is to establish environmentally sustainable operations across the entire supply chain. By implementing green supply chain practices, organizations can reduce their ecological footprint, mitigate environmental impacts, and contribute to a more sustainable future.

Social equity and justice are integral components of sustainability, focusing on promoting social well-being, equality, and inclusivity (Breesam & Kadhim Jawad, 2021; Khan et al., 2021; Muñoz-Pascual, Curado & Galende, 2019). Sustainable development seeks to ensure that all individuals have access to basic needs, such as clean water, food, healthcare, education, and opportunities, regardless of their background or circumstances.

Stakeholder engagement and collaboration are essential components of sustainable development. It involves actively participating and collaborating with stakeholders from various sectors, including governments, businesses, civil society organizations, and individuals. By engaging stakeholders, organizations can benefit from diverse perspectives, collective decision-making, and the co-creation of inclusive solutions.

Economic viability is a crucial aspect of sustainability, ensuring that activities are economically sustainable in the long term. Sustainable development encourages businesses to adopt responsible practices that balance profitability with social and environmental considerations. This includes adhering to ethical standards, promoting corporate social responsibility, and integrating sustainability into business strategies and operations (Burki, Ersoy & Dahlstrom, 2018; Liang, Zhao, Wang & Li, 2018; Slaper, 2011). Sustainable practices promote economic stability and resilience by avoiding the depletion of resources or reliance on unsustainable practices. It involves diversifying economic activities, promoting innovation, and anticipating and adapting to changing economic conditions and environmental challenges (Liang et al.,

2018). Sustainable practices emphasize the efficient use of resources to minimize waste, reduce costs, and enhance productivity. This involves adopting resource-efficient technologies, optimizing production processes, and minimizing resource consumption throughout the value chain (Nsowah & Phiri, 2023; Hong et al., 2018).

Sustainable practices encompass optimizing the entire value chain to enhance economic viability (Nsowah & Phiri, 2023; Brandenburg & Rebs, 2015). This includes collaborating with suppliers, customers, and other stakeholders to improve supply chain efficiency, reduce costs, and identify innovative solutions that create value for all participants. By integrating economic viability into sustainability efforts, organizations can pursue profitable activities that align with social and environmental goals. Balancing economic considerations with social and environmental factors ensures that economic growth is sustainable, equitable, and contributes to overall well-being and resilience (Wang & Dai, 2018; Brandenburg & Rebs, 2015).

Under the environmental dimension of the TBL, responsible sourcing is often adopted by manufacturing firms to bolster sustainable supply chain management (Chen, 2022; van den Brink, Kleijn, Tukker & Huisman, 2019). Responsible sourcing entails sourcing materials and products from suppliers who adhere to ethical and sustainable practices (Chen, 2022). This includes assessing suppliers' social and environmental performance, ensuring transparency in the supply chain, and supporting suppliers who demonstrate responsible behavior.

Environmental dimension of the TBL considers the integration of environmental factors into supply chain management. It involves minimizing the environmental impact of operations, reducing carbon emissions, conserving resources, and promoting sustainable packaging and transportation practices (Chen, 2022; Bag, Wood, Xu, Dhamija & Kayikci, 2020; van den Brink et al., 2019; Corrêa & Silva, 2016). The TBL, integral to SSCM, evaluates economic, social, and environmental impacts, aligning with its holistic approach towards sustainability. Within Ghana's pharmaceutical sector, SSCM champions TBL principles, underscoring its practical significance. This commitment resonates with the global TBL agenda, emphasizing the industry's ethical alignment. Figure 2.3 illustrates sustainability parameters commonly known as the triad of sustainability: People, Planet, and Profit.



**Figure 2. 3 Sustainability Parameters**

**Source:** Hill (2022)

The TBL is a sustainability framework that expands the focus of organizations beyond just financial performance to include social and environmental dimensions. It encourages businesses to assess their impacts and outcomes in three key areas, often referred to as the three pillars of sustainability: People, Planet, and Profit (Hill 2022; O’Neil 2018; Ferraz De Campos 2017).

***People (Social)***

This pillar considers the social impact of business operations on employees, customers, communities, and other stakeholders. It involves ensuring fair labour practices, promoting diversity and inclusion, supporting local communities, and respecting human rights (O’Neil, 2018; Agrawal et al., 2016).

***Planet (Environmental)***

This pillar focuses on minimizing the environmental impact of business activities and promoting ecological sustainability. It involves reducing resource consumption, minimizing waste generation, and addressing climate change and other environmental challenges (O’Neil 2018; Ferraz De Campos 2017).

### ***Profit (Economic)***

This pillar addresses the financial performance and economic viability of organizations. While the social and environmental dimensions are important, organizations must also be financially sustainable to support their long-term operations and growth (Gimenez et al. 2012). TBL emphasizes the need for businesses to measure and manage their impact not only in terms of financial performance but also in social and environmental dimensions. SSCM, on the other hand, is a strategic approach that aims to integrate sustainability principles into supply chain operations. Together, they offer a framework for fostering sustainable practices within the pharmaceutical industry (Pereira & Martins, 2021; Gimenez et al., 2012).

TBL encourages pharmaceutical companies to consider the environmental and social aspects of their operations. In the pharmaceutical industry, where production and distribution processes often have substantial environmental impacts, TBL provides a comprehensive assessment tool (Zaid, Jaaron & Talib Bon, 2018; Kiel, Müller, Arnold & Voigt, 2017). It prompts companies to reduce their carbon footprint, minimize waste, and adopt eco-friendly manufacturing practices. For example, pharmaceutical companies can invest in clean energy sources, optimize transportation routes to reduce emissions, and implement green packaging solutions, all of which align with the environmental dimension of TBL (Zaid et al., 2018).

The social dimension of TBL requires pharmaceutical firms to consider the well-being of various stakeholders, including employees, communities, and consumers (Depken & Zeman, 2018; Gimenez et al., 2012). SSCM aligns with this aspect by promoting fair labor practices, ethical sourcing, and community engagement (Kim & Chae, 2022; Schulte & Paris, 2022). Pharmaceutical companies can ensure that their supply chains are free from labour exploitation, support local communities through corporate social responsibility initiatives, and provide access to affordable medicines for underserved populations. These actions support the social component of TBL and enhance a company's reputation and social license to operate.

Moreover, the financial aspect of TBL intersects with SSCM by improving efficiency and cost-effectiveness. Sustainable supply chain practices often lead to reduced resource consumption, waste, and energy expenses. By implementing SSCM principles, pharmaceutical companies can identify cost-saving opportunities, such as optimizing inventory management, reducing transportation costs through route optimization, and mitigating supply chain disruptions. These

cost savings align with the financial dimension of TBL and can positively impact a company's bottom line (Schulte & Paris, 2022; Asamoah et al., 2021; Kiel et al., 2017).

In conclusion, the TBL framework provides a holistic approach for pharmaceutical companies to address sustainability challenges by considering environmental, social, and financial aspects. SSCM complements TBL by providing practical strategies for integrating sustainability into supply chain operations (Kim & Chae, 2022; Asamoah et al., 2021; Zaid et al., 2018). Together, TBL and SSCM support the adoption and implementation of sustainable practices within the pharmaceutical industry, enabling companies to reduce their environmental footprint, promote social responsibility, and enhance financial performance while contributing to a more sustainable future (Schulte & Paris, 2022; Zaid et al., 2018).

In the current study, the TBL plays a pivotal role, aligning with economic, social, and environmental sustainability in accordance with the United Nation's Sustainable Development Goals (SDGs). This study examines the impact of SSCM practices in Ghana's pharmaceutical industry on the SDGs, emphasizing the practical significance of SSCM. The study employed the TBL framework to assess the economic, social, and environmental effects of SSCM, highlighting its crucial role within the broader context of sustainability and global sustainability goals.

#### **2.2.3.2 Sustainable Supply Chain and the Sustainable Development Goals (SDGs)**

Sustainable supply chains play a significant role in achieving the SDGs by aligning business practices with the global goals (Chauhan, Kaur, Arrawatia, Ractham & Dhir, 2022; Cai & Choi, 2020). Companies and organizations that integrate sustainability into their supply chains can contribute to addressing poverty, promoting gender equality, combating climate change, and achieving other SDGs through responsible production and consumption (Chauhan et al., 2022; Cai & Choi, 2020). By linking the concept of SSCM with the SDGs, businesses and industries can make meaningful contributions to a more sustainable and equitable world while fostering innovation and resilience in their operations (Kayikci, Kazancoglu, Gozacan-Chase & Lafci, 2022; Zhou, Govindan & Xie, 2020; van Zanten & van Tulder, 2018).

The SDGs are a set of 17 global goals adopted by the United Nations in September 2015. They are officially known as the "2030 Agenda for Sustainable Development." These goals are designed to address a wide range of global challenges and serve as a shared blueprint for peace and prosperity for people and the planet by the year 2030. The SDGs offer a universally

endorsed framework for global collaboration, emphasizing integrated solutions to interconnected social, economic, and environmental challenges. They prioritize eradicating poverty, addressing environmental issues, promoting well-being, and fostering gender equality. Additionally, they stress the significance of peace, strong governance, and global partnerships for achieving a more prosperous, inclusive, and sustainable world through collective action and innovation. Below is a discussion on some of these specific goals adopted for this study:

**SDG 6 - Clean Water and Sanitation:** Sustainable supply chains implement water-efficient practices and promote responsible water use in their operations and supply chain partners. By conserving water resources and safeguarding water quality, companies contribute to SDG 6's objective of ensuring clean water and sanitation for all (Chen, 2022; van Zanten & van Tulder, 2018).

**SDG 7 - Affordable and Clean Energy:** Sustainable supply chains can reduce their reliance on fossil fuels and transition to renewable energy sources for manufacturing, transportation, and distribution processes. By adopting clean energy solutions, companies can help mitigate climate change and contribute to the goal of ensuring universal access to affordable and clean energy (Chauhan et al., 2022; Aghili, Hosseini, Bin Mohammed & Zainul Abidin, 2019).

**SDG 12 - Responsible Consumption and Production:** Sustainable supply chains promote the adoption of circular economy principles, which encourage reduced waste, efficient resource use, and recycling. By implementing sustainable sourcing, eco-design, and waste reduction practices, companies can minimize their environmental impact, improve resource efficiency, and support responsible consumption and production patterns (Chen, 2022; van den Brink et al., 2019).

**SDG 13 - Climate Action:** Sustainable supply chains actively work to reduce their carbon footprint by implementing emission reduction strategies, such as optimizing transportation routes, using energy-efficient technologies, and investing in carbon offset programmes. By aligning their operations with climate action objectives, companies contribute to global efforts to limit global warming and its impacts (Menon & Ravi, 2021; ACC Limited 2020).

By aligning its efforts with these specific SDGs, firms demonstrate their commitment to contributing to a sustainable future. Through its actions related to health and well-being, clean water and sanitation, responsible consumption and production, and climate action, firms can

positively impact the lives of people, protect the environment, and drive progress toward achieving the SDGs.

Pharmaceutical companies are actively contributing to the attainment of the SDGs through a range of initiatives and practices that align with the global sustainability agenda (Wilkinson et al., 2022; Littlewood & Holt, 2018). One crucial aspect is the commitment to improving global health, directly addressing SDG 3 (Good Health and Well-being). These companies invest significantly in research and development to create affordable and accessible medicines, particularly for diseases that disproportionately affect developing nations. Initiatives such as patent pools, licensing agreements, and partnerships with non-governmental organizations (NGOs) help increase the availability of life-saving medicines in low-income countries (UNDP, 2023).

Pharmaceutical firms also play a vital role in enhancing healthcare systems, aligning with the same SDG 3. They invest in improving healthcare infrastructure, training healthcare workers, and supporting disease awareness campaigns. By strengthening healthcare systems, these companies contribute to the goal of ensuring quality healthcare for all (IFPMA2023). Another area where pharmaceutical companies make a significant impact is responsible production and consumption (SDG 12). They are increasingly focused on reducing waste, minimizing their environmental footprint, and promoting sustainable packaging. Investments in green technologies and sustainable supply chain practices help minimize their environmental impact and align with global efforts to promote responsible consumption and production (PhRMA, 2020).

Collaboration is essential in achieving the SDGs, and pharmaceutical companies actively engage in partnerships to fulfill SDG 17 (Partnerships for the Goals). They work closely with governments, NGOs, and international organizations to strengthen healthcare systems, provide disaster relief, and combat global health crises such as pandemics. These partnerships enable a collective approach to addressing complex global challenges (IFPMA, 2023).

Furthermore, research and innovation within the pharmaceutical industry contribute to multiple SDGs. Drug discovery and development are fundamental in tackling various diseases, aligning with SDG 3. Additionally, advancements in healthcare technology, such as telemedicine and digital health solutions, can improve healthcare access (SDG 3) and contribute to economic growth and decent work (SDG 8) (Gigliotti, Schmidt-Traub & Bastianoni, 2018; United

Nations, 2016). While pharmaceutical companies make substantial contributions to the SDGs, it is crucial to monitor their practices and ensure alignment with ethical and sustainable standards. This will maximize their positive impact on global sustainability efforts and help address critical challenges related to health, environmental responsibility, and partnership building according to the UNDP (2023). Figure 2.4 presents the sustainability pillars, showcasing the SDGs, which comprise 17 global objectives established by the United Nations.



**Figure 2. 4 Sustainability Pillars**

Source: (United Nations 2015)

### 2.2.4 Historical Antecedents of Sustainable Supply Chain management.

This section presents some historical antecedents of sustainable supply chain management.

#### *The Global Perspective*

The growing global environmental concerns have heightened experts' interest in the impact of sustainability within supply chains. The organization's supply chain is responsible for 12.9 percent of environmental degradation and is a significant source of hazardous waste, water and air pollution, as well as gas emissions and energy waste as suggested by the Intergovernmental

Panel on Climate Change, (IPCC), (2016). Unless sustainable supply chain operations are designed to increase efficiency, these greater emissions pose a hazard to the environment. As a result, worldwide demand for adding social and environmental factors in sustainable supply chain strategies is growing (Alzoubi et al., 2020).

SCM arose as a discipline during the globalization period that began in 1944 with the foundation of the Bretton Woods system and accelerated in the 1990s with the Uruguay round of General Agreement on Tariffs and Trade (GATT) and the founding of the World Trade Organization according to Langevin (2023) and Howse (2016). Supply chains have become a strategic concern and a potentially intriguing phenomena to research as a result of several globalizing tendencies, such as rising competitive pressures, opening up markets to trade, and outsourcing (Yu et al., 2020). However, as the size of supply chain activities has grown genuinely global, many of these developments have resulted in massive alterations in the natural environment.

In the Anthropocene, global supply networks became one of the primary engines of economic expansion and environmental degradation, helping to turn the concept of growth from a theoretical potential to a "fundamental social ideal" (Nieuwenhuis et al., 2019). SCM has benefited from many of the period's globalizing tendencies, such as rising competitive pressures and market openness, and has contributed to globalization via outsourcing, which has worked as a driver of economic growth in nations like China. Global supply networks became humanity's major method of material production throughout this time and are therefore one of the most important ways in which the Earth system is changing. As a result, it is difficult to see how we can become responsible stewards of the Earth system or fully implement these SDGs without a significant shift in how firms organize their supply chains toward post-global supply chains (Nieuwenhuis et al., 2019).

Any sustainable effort or activity's existing knowledge might be related to a cost-benefit analysis. Managers often make choices that are in line with their strategic direction and should result in financial gains. Some people believe that any contribution to sustainable activities must be viewed economically. As a result of increasing demands from numerous stakeholders, we are looking for the best practices to improve sustainability while maintaining a high level of performance. Recent research has provided conceptual frameworks and methodologies for supply chain management strategies (Yang, Chen, Lee & Cheng, 2023; Florescu, Ceptureanu, Cruceru & Ceptureanu, 2019). Social responsibility issues, compliance, human rights, equity,

fair wages, social welfare, health and safety, ethics, transparency and nondiscrimination, green supply chain, environmentally friendly products, resource preservation, and 'end of life' assessment are all examples of sustainability issues that could apply to any company (Alzoubi et al., 2020).

The pharmaceutical sector not only benefits patients, but it also contributes significantly to the European economy. According to the European Commission, it is one of the best-performing business sectors in Europe and a major contributor to economic growth at a time when most business sectors in the European Union (EU) are experiencing increased operational challenges. In a report by the Pharmaceutical European Federation of Pharmaceutical Industries and Associations, firms invested an estimated €30,630 million in R&D in Europe in 2013, creating more than 690,000 direct jobs and three to four times as many indirect jobs (upstream and downstream) as they did direct jobs (Treves, 2015).

As seen by its average yearly growth rate, it also serves as a significant source of development and economic success. Between 2006 and 2011, there was a 2.5 percent increase in the production index, and during the same time, there was a 3.6 percent increase in labor productivity per person employed (Treves, 2015). The European Union's trading prowess is significantly boosted by the pharmaceutical sector in Europe. Additionally, the EU is a significant global trader of pharmaceutical and medical goods. Including all 28 EU Member States, its overall commerce in 2013 came to € 156.9 billion, with exports totaling € 107.4 billion or more. Therefore, maintaining a healthy pharmaceutical sector in Europe is crucial for trade, science, economic development, and public health (Treves, 2015).

Both the EU and individual countries decide the regulations that apply to drugs (Treves, 2015). The framework for putting a pharmaceutical product on the market in the EU and other related topics such as the oversight of goods after authorization, manufacturing, wholesaling, or advertising of pharmaceuticals for human use, clinical trials, and specific rules addressing the particularities of certain types of pharmaceuticals and promoting research in areas like orphan pharmaceuticals fall under the purview of the EU (Tessier et al., 2021; Powrie-Smith, 2017). For the pharmaceutical industry, the mix of national and EU standards and regulations can sometimes cause confusion and additional costs (Treves, 2015).

Prior to the 1990s, the pharmaceutical industry's supply chain and its ensuing SCM were centred on the production and sourcing of test items for regulatory review in clinical trials of

drugs and associated goods (de Campos, de Paula, Pagani & Guarnieri, 2017; Singh, Kumar & Kumar, 2016). This was justified by the fact that the makers thought it was unnecessary to make additional investments in a medication supply chain prior to approval. This strategy produced a limited and transient mindset.

In order to stay competitive and fend off competition from emerging economies, pharmaceutical companies have been forced to review and amend their approach to SCM and Value delivery since the 1990s due to significant economic and operating changes and disruptions as well as a more sophisticated consumer. The fundamental idea of interconnection is still present, but SCM has grown more complicated as it has become clear that fast fixes are no longer a practical strategy for long-term profitability and that the discovery of core causes and long-term remedies is the way to go (Carter et al., 2020; Carter & Easton, 2011)

The main goals of pharmaceutical companies, as well as government and public sector pharmaceutical supply chains, are to assure the quality, safety, and efficacy of these medications, as well as to give simple and timely access to medications and the supplies that go with them (Hoffman & Bowditch, 2020; Theophilus Ampah & Sidi Ali, 2019; Shree Bhagwati, 2016). A generic supply chain procedure exists that can be ascribed to any pharmaceutical firm, despite the fact that this might lead to very complicated situations that differ dependent on national, and in the case of the companies with European headquarters, Union legislations and market structures (Sarwar, 2020; Capo, Brunetta & Boccardelli, 2014).

Outsourcing is becoming more crucial for the European pharmaceutical business. Modern pharmaceutical corporations are increasingly outsourcing more of their routine tasks to wholesalers, third- and fourth-party service providers, and other businesses (Huq, Pawar & Rogers, 2016; Singh et al., 2016). Typically, a pharmaceutical business would oversee its own supply chain operations, including planning, regional operational procurement and delivery services, as well as worldwide strategic procurement and enabling tasks. They contract out their sourcing, planning, and delivery processes as well as their work on new products. Maximum delivery performance, reduced costs, maximum volume flexibility and responsiveness, and reduced risks are these firms' top value drivers (Huq et al., 2016; Singh et al., 2016). Collaboration with important customers and suppliers as well as end-to-end supply chain planning are issues that the top businesses are paying greater attention to and significance to. Continuous manufacturing and related operations improvements continue to get significant attention. These wholesalers also provide services such professional storage and delivery in

line with the appropriate regulations and unique requirements for medications handling, as well as other custom solutions required by the pharmaceutical industry (Aulakh, Settanni & Srail, 2022; Doumbia et al., 2021; Ding, 2018). These tailored solutions encompass aspects such as tracking products, overseeing temperature, humidity, and light levels, as well as region-specific packaging and labeling.

### **The African Perspective**

In the African context, SSCM has deep historical antecedents rooted in the continent's rich and diverse cultural and economic heritage. One significant historical antecedent of SSCM in Africa is the traditional African concept of 'Ubuntu', emphasizing interconnectedness and community welfare (Duffett & Wakeham, 2023; Kauppi, Salmi & You, 2018). This ethos is reflected in modern SSCM practices through stakeholder engagement, transparency, and ethical sourcing, as organizations aim to create positive social impacts within their supply chains (Kauppi et al., 2018). Additionally, African economies have a history of reliance on agriculture and natural resource extraction. The sustainability of these sectors has long been a concern, leading to practices such as crop rotation and communal land management, which align with contemporary sustainability principles (Mwangi, Despoudi, Espindola, Spanaki & Papadopoulos, 2022; Iakovou, Bochtis, Vlachos & Aidonis, 2015). The adoption of these practices in modern supply chains contributes to resource conservation and resilience. Furthermore, Africa's experiences with colonization and exploitation by external powers have heightened the continent's sensitivity to social and economic injustices. This historical context has influenced contemporary SSCM efforts, emphasizing fair labour practices, local empowerment, and responsible sourcing to rectify historical inequalities (Kauppi et al., 2018). Scholars have recognized these historical antecedents.

Africa has a lot of promise but also faces difficulties. It will take time and cooperation to create an effective and sustainable supply chain (Ogah & Asiegbu, 2022). To maintain the sustainability of African economies, all stakeholders must cooperate to improve supply chains throughout the continent by integrating, optimizing, and strengthening technology and infrastructure (Mwangi et al., 2022; Ogah & Asiegbu, 2022; Iakovou et al., 2015). Just like other continents, Africa as a whole is reconsidering its traditional supply chain systems as a result of the COVID-19 Pandemic (Forehand, Román & Schaefer, 2021; Karuppiah, Sankaranarayanan, Ali & Paul, 2021). The emergence of the African Continental Free Trade

Area (AfCFTA) is bringing new approaches to the attainment of SSCM within the continent (Madu, 2023). Africa's growth depends heavily on environmentally sound supply networks, and the need to rethink supply chains creates potential for green industrialization (Madu, 2023). African businesses are positioning to contribute important natural resources to "green global supply chains." Minerals like lithium and cobalt are now in high demand across the globe and very rare outside Africa. Many African countries are therefore taking advantage by building their own supply chain (Madu, 2023; Church & Crawford, 2020). It must be admitted that even though Africa has a large pool of youth and younger generations, the continent still rates low when it comes to sustainable supply chains measures (Madu, 2023).

In conclusion, Africa's historical antecedents, including 'Ubuntu' values, sustainable agricultural practices, and past injustices, have contributed to the development and adoption of sustainable supply chain management practices in the continent. These historical foundations provide a unique perspective and motivation for organizations to pursue SSCM in Africa, promoting environmental stewardship, social equity, and economic development. The next sections provided a review of upstream pharmaceutical sustainable supply chain management with focus on global and Africa.

### **2.2.5 State of upstream pharmaceutical sustainable supply chain management**

The discussion of the state of upstream pharmaceutical sustainable supply chain management under this section is discussed from the perspectives of global and Africa.

#### **2.2.5.1 *Global Perspective***

The state of upstream pharmaceutical SSCM globally is evolving as the industry faces increasing pressure to balance commercial interests with environmental and societal responsibilities (Aulakh et al., 2022; Yu et al., 2020). Upstream pharmaceutical SSCM focuses on the procurement and production phases of the supply chain, making it a critical aspect of ensuring the availability of safe and effective medicines while minimizing negative environmental and social impacts (Aulakh et al., 2022; Ding, 2018; Singh et al., 2016).

One key trend in upstream pharmaceutical SSCM is the growing emphasis on transparency and traceability (Liu, Song & Liu, 2023; Trautmann, Hübner & , 2022). Pharmaceutical companies are recognizing the importance of understanding the origins of raw materials and ensuring their sustainability (Yu et al., 2020; Moosivand, Ghatari & Rasekh, 2019). This trend is driven by

regulatory requirements and consumer demand for ethical sourcing. For instance, regulations such as the European Union's Conflict Minerals Regulation (EU 2017/821) require companies to source minerals responsibly, addressing human rights and environmental concerns (MacChi, 2021; Magallón, 2020).

Environmental sustainability is also a major concern in upstream pharmaceutical SSCM as opined by Veleva, Cue & Todorova (2018). Companies are implementing measures to reduce carbon emissions and minimize waste in manufacturing processes. This includes investing in green manufacturing technologies and adopting circular economy principles (Velenturf & Purnell, 2021; Suárez-Eiroa, Fernández, Méndez-Martínez & Soto-Oñate, 2019). Initiatives such as the Pharmaceutical Supply Chain Initiative (PSCI) promote environmental responsibility and collaboration among industry players (Veleva, Cue & Todorova, 2018). Ganguly and Kumar (2019) and Raka and Liangrokpart (2017) recommend using the analytic hierarchy process (AHP) approach to identify high-priority suppliers and outsourced manufacturers in order to quantify the environmental and social consequences experienced by either suppliers or manufacturing facilities. They all favor regulatory compliance (social responsibility) and environmental effect above conventional factors such as cost, quality, service, risk management, and so on (GHG emissions). In terms of environmental performance, ISO14000 certified vendors are expected to lower the environmental hazards associated with raw material procurement (Xie & Breen, 2012).

Moreover, pharmaceutical companies are increasingly focusing on social sustainability in their supply chains. This involves ensuring fair labour practices, human rights compliance, and equitable access to healthcare. Initiatives such as the Access to Medicine Index evaluate and rank pharmaceutical companies based on their efforts to improve global access to essential medicines, reflecting the industry's commitment to social responsibility.

However, challenges persist in achieving comprehensive upstream pharmaceutical SSCM. The industry is characterized by complex, global supply networks with diverse stakeholders. Ensuring sustainability across these networks requires extensive coordination and investment. Additionally, there is a need for harmonized global standards and regulations to guide pharmaceutical companies in their sustainability efforts.

In conclusion, upstream pharmaceutical SSCM is evolving globally, with a growing emphasis on transparency, environmental sustainability, and social responsibility. While progress is being made, challenges remain, particularly in achieving consistency and harmonization across complex supply networks. Collaboration among pharmaceutical companies, governments, and NGOs is essential to drive further improvements and ensure the availability of safe and sustainable medicines worldwide.

#### ***2.2.5.2 African Perspective***

The pharmaceutical business is increasingly sourcing pharmaceutical manufacturing and associated services from developing nations (Dalenogare, Benitez, Ayala & Frank, 2018; Ding, 2018). The state of upstream pharmaceutical SSCM in Africa presents a unique set of challenges and opportunities. Upstream pharmaceutical SSCM in the region is marked by a range of factors including limited access to essential medicines, weak healthcare infrastructure, and concerns about the environmental and social impact of pharmaceutical production (Aulakh et al. 2022; Shree Bhagwati 2016).

One significant challenge in African pharmaceutical SSCM is ensuring access to essential medicines. Many African countries struggle to procure and distribute pharmaceutical products efficiently (Aulakh et al. 2022; Shree Bhagwati 2016). This challenge has been exacerbated by the COVID-19 pandemic, which highlighted the need for resilient supply chains to ensure timely access to vaccines and other critical medications (Hussain, Ambreen, Muzammil, Raza & Ali 2020; Yu et al. 2020).

Moreover, environmental sustainability is an emerging concern in African pharmaceutical SSCM. The production of pharmaceuticals can result in environmental pollution, particularly from the discharge of pharmaceutical residues into water sources. African governments and international organizations are increasingly recognizing the importance of minimizing such impacts. For example, the African Union's Pharmaceutical Manufacturing Plan for Africa emphasizes the need for environmentally sustainable pharmaceutical production practices (Lartey, Graham, Lukulay & Ndomondo-Sigonda 2018).

Social sustainability is another crucial aspect of pharmaceutical SSCM in Africa. Ensuring fair labor practices, ethical sourcing of raw materials, and equitable access to healthcare are priorities for the continent. Initiatives like the African Medicines Regulatory Harmonization

program aim to improve access to safe and effective medicines across African countries while promoting ethical pharmaceutical manufacturing practices (Ndomondo-Sigonda et al. 2018).

Despite these challenges, there are opportunities for improvement in African pharmaceutical SSCM. The African Medicines Agency (AMA) is working to harmonize regulatory processes across the continent, which can streamline supply chain operations. Additionally, partnerships with international organizations and pharmaceutical companies can facilitate technology transfer and capacity building to enhance local pharmaceutical production capabilities (African Union 2021; Ncube, Dube & Ward 2021).

In conclusion, the state of upstream pharmaceutical sustainable supply chain management in Africa is characterized by both challenges and opportunities. Access to essential medicines, environmental sustainability, and social responsibility are key concerns. Collaboration among African governments, international organizations, and the pharmaceutical industry is essential to address these issues and strengthen the resilience and sustainability of pharmaceutical supply chains on the continent.

#### ***2.2.6 Pharmaceutical Supply Chain Management in Ghana***

Ensuring that SSCM is met means that manufacturing firms and the entire industry is regulated by appropriate bodies in a nation. In Ghana, major manufacturing is centered around electronics, light manufacturing, aluminum smelting, food processing, cement, and small commercial shipbuilding. Food and beverage production, textiles, chemicals and pharmaceuticals, and metal and wood processing are among the other sectors (Alhassan, 2021; Bour et al., 2019). Thus, the pharmaceutical industry must be seen to be protecting the environment, society and people engaged in the process of producing the various drugs into the market. In Ghana, the Pharmacy Council plays an important role in regulating the production, distribution and supply of drugs and medical products within the country. Again, access to necessary medications for everyone, quality assurance for all pharmaceuticals on the market, a functioning and efficient supply chain, and sensible use of medicines by professionals and patients are the main aims of Ghana's pharmaceutical policy. In the national health policy, there is also a commitment to enhance the domestic pharmaceutical sector, which is detailed under health industry. The overall legal framework for the pharmaceutical sector is set by the Food and Drugs Law from 1992, amended by Act 523 in 1996. It defines the role of the food and drugs board as separate entity under control of the Ministry of Health (MOH), responsible for regulating the sector. The Pharmacy Council is a statutory body established by an Act of

Parliament, the Health Professions Regulatory Bodies Act (Act 857) to regulate the practice of Pharmacy in Ghana. Therefore, ensuring that pharmaceutical companies comply with operational standards and sustainable measures is the sole responsibility of the Pharmacy Council Ghana as supported by the Ministry of Health and the Ghana Health Service.

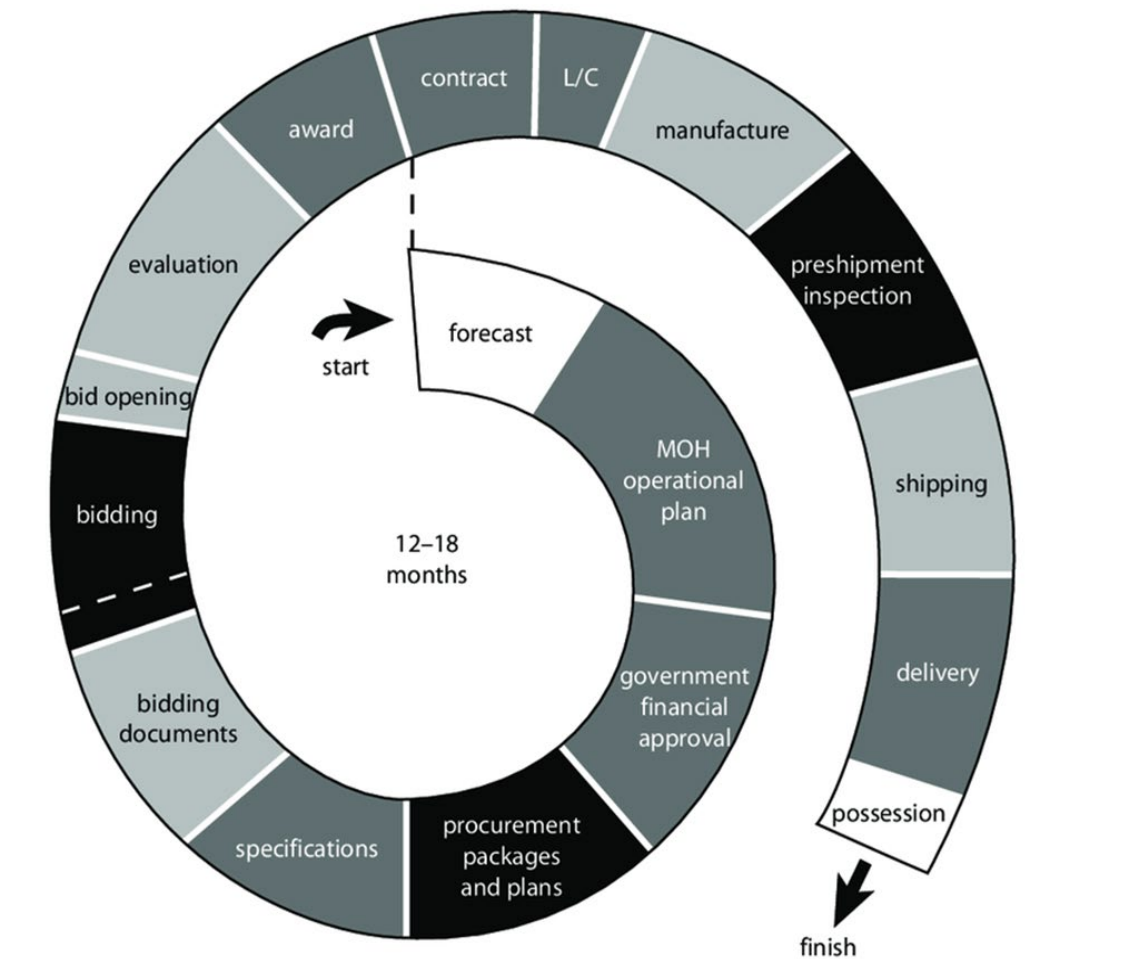
SSCM in Ghana's pharmaceutical industry faces several limitations that impact its effectiveness and, consequently, the industry's overall performance and profitability. These limitations stem from a variety of factors, including regulatory challenges, infrastructure deficiencies, and resource constraints (Adegoke et al., 2021; Afum et al., 2020).

One significant limitation is the complex and evolving regulatory landscape in Ghana. The pharmaceutical industry operates in a heavily regulated environment, which can lead to delays and complications in obtaining permits, licenses, and approvals for sustainable practices. Frequent changes in regulations and bureaucratic hurdles can hinder the industry's ability to adopt and implement sustainable supply chain strategies (Nsowah & Phiri, 2023; Adegoke et al., 2021). Infrastructure deficiencies also pose a considerable challenge. Inadequate transportation and logistics infrastructure can lead to delays and disruptions in the supply chain. This impacts the timely delivery of pharmaceutical products, potentially affecting patient access to medicines and creating inefficiencies in the supply chain (Sharma, Gupta & Jha, 2020). Resource constraints, particularly financial limitations, are another significant limitation in Ghana's pharmaceutical SSCM. Sustainable practices often require investments in technology, training, and infrastructure improvements. Smaller pharmaceutical companies may struggle to allocate the necessary resources to implement sustainable supply chain initiatives (Esfahbodi, Zhang & Watson, 2016).

The impact of these limitations on the pharmaceutical industry's performance and profitability is substantial. Delays in regulatory approvals and supply chain disruptions can lead to stockouts or overstock situations, resulting in increased carrying costs and potential revenue losses (De Martini, 2021).

Furthermore, resource constraints can limit the industry's ability to innovate and optimize its supply chain processes, potentially leading to higher operational costs and reduced profitability (Asif, 2022; De Martini, 2021). In conclusion, the limitations in Ghana's pharmaceutical SSCM, driven by regulatory challenges, infrastructure deficiencies, and resource constraints, have significant implications for the industry's performance and profitability. Overcoming

these limitations requires a coordinated effort from both the government and industry stakeholders to create a more conducive environment for sustainable supply chain practices and, ultimately, to ensure the reliable and sustainable provision of pharmaceutical products to the population. The next section provides an extensive review according to the study’s specific objectives presented in chapter 1. A Practical Approach to Pharmaceutical Supply Chain Management in Ghana is depicted in the Figure 2.5 below.



**Figure 2. 5 A Practical Approach to Pharmaceutical Supply Chain Management in Ghana.**

Source:(Seiter 2010)

### 2.2.7 Objective One: Upstream pharmaceutical sustainable supply chain management practices.

In a study conducted by Jia et al. (2015), SSCM practices identified included supplier compliance auditing, sustainable packaging, designing products with recyclable materials, company-wide environmental audits, environmental safety practices, among others. These

practices were further classified into areas such as management, supplier, design, internal, and customer (Jia et al., 2015). The measurement items that indicate SSCM practices were thought of based on environmental, social, and economic dimensions that could translate into increased performance outcomes (Jia et al., 2015).

### **2.2.7.1 *Supplier Compliance Auditing***

The actions of a manufacturer's own suppliers and vendors with regard to quality have a role in its ability to supply high-quality goods and maintain regulatory compliance. However, the maker continues to bear ultimate liability (Islam, Deegan & Gray, 2018; Egels-Zandén, 2014). Supplier compliance auditing is a critical practice within the pharmaceutical industry to ensure that suppliers and partners meet stringent regulatory and quality standards (Caro, Chintapalli, Rajaram & Tang, 2018). These audits play a pivotal role in upholding the safety, efficacy, and integrity of pharmaceutical products, given the industry's rigorous regulatory environment (Abraham, 2023; Caro et al., 2018; Adobor, 2012). Supplier compliance audits are essential for regulatory adherence. Pharmaceutical companies must comply with stringent regulations enforced by health authorities such as the Food and Drug Authority (FDA) in Ghana for instance (Owusu-Asante et al., 2023; Komlaga et al., 2015). Supplier audits verify that suppliers meet these regulations, ensuring that raw materials, manufacturing processes, and quality control systems align with established standards (Caro et al., 2018). Quality assurance is a paramount concern in pharmaceuticals, and supplier compliance audits are a proactive measure to maintain high product quality (Caro et al., 2018; Egels-Zandén, 2014). By evaluating suppliers' manufacturing practices and quality control systems, pharmaceutical companies can identify potential risks and take corrective actions to prevent quality issues that could compromise patient safety (Caro et al., 2018; Chen & Lee, 2017). Supplier compliance audits also contribute to risk management. Identifying and mitigating risks within the supply chain, such as supplier non-compliance or deviations from quality standards, is crucial for pharmaceutical companies to maintain product consistency and minimize the possibility of product recalls (Chen & Lee, 2017; Egels-Zandén, 2014). Moreover, audits foster transparency and accountability. They promote open communication and collaboration between pharmaceutical companies and their suppliers, leading to improved supply chain relationships and a shared commitment to quality and compliance (Caro et al., 2018). In summary, supplier compliance auditing is indispensable within the pharmaceutical industry due to its critical role in ensuring regulatory compliance, maintaining product quality, managing risks, and fostering

transparency. These audits are essential to safeguarding patient health and maintaining the reputation of pharmaceutical companies in a highly regulated and quality-driven sector.

#### ***2.2.7.2 Sustainable Packaging***

Sustainable packaging refers to the design, production, and use of packaging materials and systems that minimize their environmental impact while meeting the practical and protective functions of packaging (Boz, Korhonen & Sand, 2020; Meherishi, Narayana & Ranjani, 2019). It embodies the principles of sustainability, aiming to reduce waste, conserve resources, and minimize the ecological footprint associated with packaging throughout its lifecycle (Morashti, An & Jang, 2022; Boz et al., 2020). Key components of sustainable packaging include material selection, minimalism in design, and a focus on recyclability and reusability (Ibrahim et al., 2022; Meherishi et al., 2019). Material selection involves choosing renewable, recyclable, or biodegradable materials, such as recycled paper, cardboard, glass, or sustainable-sourced plastics. Minimalism in design ensures that packaging uses as little material as possible while effectively protecting the product, thereby reducing resource use and waste generation (Morashti et al., 2022; Meherishi et al., 2019). Sustainable packaging in the pharmaceutical industry involves the use of environmentally responsible materials and design principles to minimize the ecological footprint of pharmaceutical products (Ding, 2018; Abdul Khalil et al., 2016). It prioritizes recyclable materials, reduces excess packaging, and encourages eco-friendly production processes. Sustainable packaging not only aligns with growing consumer and regulatory expectations for environmentally conscious products but also enhances brand reputation (Ding, 2018). It plays a crucial role in reducing pharmaceutical waste, conserving resources, and promoting a more sustainable and responsible pharmaceutical sector. Sustainable packaging aligns with broader environmental and social objectives, contributing to the reduction of packaging waste in ecosystems, the conservation of resources, and the promotion of responsible consumption (Ding, 2018; Abdul Khalil et al., 2016). Companies are increasingly adopting sustainable packaging not only to comply with regulations but also to enhance their brand image, reduce costs, and play a role in creating a more sustainable future by reducing the environmental impact of packaging materials (Meherishi et al., 2019; Abdul Khalil et al., 2016).

#### ***2.2.7.3 Designing products with recyclable materials.***

Designing products with recyclable materials is a fundamental aspect of sustainable product development (Velenturf & Purnell, 2021; Alkaya & Demirer, 2015). This approach involves

creating products in a way that allows their components or materials to be easily disassembled and recycled at the end of their life cycle, thereby reducing waste and conserving valuable resources (Hatti-Kaul, Nilsson, Zhang & Rehnberg, 2020). Designing pharmaceutical products with recyclable materials is essential for reducing the industry's environmental impact (Asif, 2022; Murray, 2022). It involves selecting packaging and components that can be easily separated and recycled, minimizing waste. This practice not only aligns with sustainability goals but also meets consumer demand for eco-friendly products. Recyclable materials in pharmaceutical packaging, such as plastics and cardboard, contribute to resource conservation and reduced landfill waste (Abdul Khalil et al., 2016).

Furthermore, responsible material selection supports a circular economy, where materials are reused, recycled, and repurposed, reducing the need for virgin resources and promoting a more environmentally responsible pharmaceutical industry (Abraham, 2023; Meherishi et al., 2019).

#### ***2.2.7.4 Company-Wide Environmental Audits***

Company-wide environmental audits are a vital tool for organizations across various industries to assess and improve their environmental performance, ensure regulatory compliance, and demonstrate their commitment to sustainability (Sharma, Das, Braje, Dash & Handa, 2020; Agarwal & Mishra, 2019). Environmental audits provide a comprehensive overview of an organization's environmental impact (Lee, Park, Song & Yook, 2017). They assess energy consumption, waste generation, emissions, and resource use across the entire company, identifying areas where improvements can be made to reduce environmental harm. Environmental audits also play a crucial role in compliance with environmental regulations and laws. By thoroughly examining operations and processes, organizations can pinpoint areas where they may be falling short of compliance and take corrective actions to avoid potential legal and financial consequences (Agarwal & Mishra, 2019; Lee et al., 2017). Company-wide environmental audits in the pharmaceutical industry are comprehensive evaluations of an organization's environmental practices and impact (Sharma, Das, et al., 2020; Agarwal & Mishra, 2019). These audits assess energy consumption, waste generation, emissions, and resource use across the company. They are vital for ensuring regulatory compliance, minimizing environmental harm, and improving sustainability (Agarwal & Mishra, 2019). By identifying inefficiencies and areas of improvement, pharmaceutical companies can reduce operational costs, enhance their environmental performance, and demonstrate their commitment to sustainability to stakeholders. Environmental audits play a crucial role in setting

and achieving sustainability goals, ultimately helping the pharmaceutical industry reduce its environmental footprint and contribute to a greener, more responsible future (Agarwal & Mishra, 2019; Lee et al., 2017). In conclusion, company-wide environmental audits are a critical practice for organizations committed to minimizing their environmental footprint, complying with regulations, reducing operational costs, achieving sustainability goals, and enhancing transparency. These audits help organizations become more environmentally responsible and contribute to a greener, more sustainable future.

#### ***2.2.7.5 Environmental Safety Practices***

Environmental safety practices within the pharmaceutical industry are of paramount importance due to the industry's potential environmental impact and the need to ensure the safety of both the environment and public health (Klemeš, Fan, Tan & Jiang, 2020; aus der Beek et al., 2016). These practices encompass a range of measures designed to minimize pollution, reduce waste, and adhere to stringent regulatory requirements (Klemeš et al., 2020; Sharma, Das, et al., 2020; Falakh & Setiani, 2018). Pharmaceutical companies implement rigorous waste management strategies. They carefully handle hazardous waste, including chemicals, solvents, and biological materials, to prevent contamination of soil and water. This often involves strict disposal protocols and the use of specialized waste treatment facilities to ensure proper disposal and prevent environmental harm (Hatti-Kaul et al., 2020; Sharma, Das, et al., 2020; Sasu, Kümmerer & Kranert, 2011). Furthermore, pharmaceutical companies invest in eco-friendly manufacturing processes. Green chemistry principles are increasingly applied to minimize the use of hazardous materials, reduce energy consumption, and generate fewer by-products during drug production (Sharma, Das, et al., 2020; Veleva, Cue, Todorova, et al., 2018). This approach helps mitigate the industry's environmental footprint. Moreover, adherence to regulatory requirements is a fundamental aspect of environmental safety practices in the pharmaceutical industry. Companies must comply with stringent environmental regulations set by agencies such as the Environmental Protection Agency (EPA) (aus der Beek et al., 2016). Failure to comply can result in significant fines and legal consequences.

In summary, environmental safety practices within the pharmaceutical industry are critical for protecting the environment, public health, and ensuring regulatory compliance. These practices encompass waste management, eco-friendly manufacturing, sustainable packaging, and strict adherence to environmental regulations, contributing to a more responsible and sustainable pharmaceutical sector.

#### **2.2.7.6 Strategic Orientation**

The realization by a corporation of the systematic, strategic consequences of the processes and activities involved in managing the various flows in a supply chain is known as supply chain orientation (Liu, Eweje, He & Lin, 2020; Puspita, Christiananta & Ellitan, 2020). So, if a company's management as a whole can comprehend the ramifications of managing the upstream and downstream flows of goods, services, money, and information between their suppliers and consumers, then they are likely to have a supply chain orientation. For supply chain management to be implemented successfully, all the businesses that are directly related to the chain must have a supply chain orientation (Puspita et al., 2020; Yusoff, Ashari & Salleh, 2016).

Strategic orientation may be considered as the set of values that guide corporate operations, shape employee behaviour, and affect company decisions (Liu et al., 2020; Yusoff et al., 2016). Businesses manage and carry out their operations with a strategic perspective in an effort to preserve and enhance corporate performance (Habib et al. 2021). Strategic orientation may boost competitive advantage and corporate performance, according to research on strategic management of strategic orientation (Habib et al., 2021; Alsadi & Aloulou, 2021). Strategic orientation is a special and beneficial asset that enhances performance and competitive advantage.

#### **2.2.7.7 Continuity**

This relates to the ongoing interactions between the SC partners. As a result, techniques for creating long-lasting bonds, creating SC partners, and choosing reliable partners may be discovered here (Kaur, Kumar & Luthra, 2022). These procedures are categorized as part of continuity, which also refers to the supply chain's effective long-term competitiveness (Kaur et al., 2022).

#### **2.2.7.8 Collaboration**

Collaboration establishes a connection between the structural components and day-to-day operational activities within businesses (Patrucco, Luzzini & Ronchi, 2017; Cao & Zhang, 2011). On the one hand, structural decisions are taken about the level of shared information and the technological and logistical integration of the supply chain partners (Arsawan et al., 2022; Cao & Zhang, 2011). The goal of joint development is to jointly create new technologies, procedures, and goods. On the other side, the degree of SSCM processes might be connected to the more operational organization. Due to high pressure group demands or a limited supplier

base and the associated disruption risk, sustainable supply chains are subject to significant risks (Arsawan et al., 2022; Dominguez, Cannella, Ponte & Framinan, 2022; Patrucco et al., 2017).

#### **2.2.7.9 Risk Management**

The practice of individual supplier monitoring is one that may be seen in SSCM. Individual partners are frequently visited by corporate representatives or in-house auditors to determine their requirements and progress toward predetermined objectives (Gurtu & Johny, 2021; Chen & Lee, 2017). Standards and certifications, such the ISO 14001 or EMAS, tend to be more inclusive and cater to a wider range of businesses. They can also be managed by independent auditors while maintaining a high level of confidence. Pressure groups engage in actions that can be unstable for a business and can hurt its performance or reputation. Stakeholders would need to be actively engaged, managed, and monitored in terms of stakeholder management. Companies adapt to these challenges by using certain business techniques (Fakir & Jusoh, 2020; Clark, 2019; Scholten & Fynes, 2017c).

#### **2.2.7.10 Ethical and Responsible Sourcing**

Ethical and responsible sourcing in the pharmaceutical industry is a fundamental practice that involves the careful selection of suppliers and partners who adhere to ethical, social, and environmental standards (Chen, 2022). This approach ensures that raw materials and active pharmaceutical ingredients (APIs) used in drug production are sourced responsibly, aligning with the industry's commitment to quality, compliance, and sustainability (Jalundhwala & Londhe, 2023; Chen, Yao & Zhu, 2020). One key aspect of ethical and responsible sourcing is minimizing the risk of supply chain disruptions (van den Brink et al., 2019). By engaging with suppliers who prioritize ethical and responsible practices, pharmaceutical companies reduce the likelihood of interruptions in the supply of critical materials, ensuring the consistent availability of medicines to patients (van den Brink et al., 2019; van Weele & van Tubergen, 2017). Moreover, responsible sourcing is a proactive step in mitigating the negative impact on local communities and the environment. It includes considerations such as fair labor practices, ethical business conduct, and sustainable resource management (Chen et al., 2020; Magallón, 2020). Pharmaceutical companies that uphold these standards contribute to social equity, environmental stewardship, and responsible global citizenship. Ethical sourcing practices also align with regulatory requirements and consumer expectations for transparent and socially responsible pharmaceutical products (Iglesias, Markovic, Bagherzadeh & Singh, 2020;

Mehralian, Nazari, Zarei & Rasekh, 2016). Compliance with industry regulations and international standards reinforces the industry's commitment to ethical sourcing.

In conclusion, ethical and responsible sourcing in the pharmaceutical industry is a multifaceted practice that safeguards supply chains, promotes ethical business conduct, and contributes to sustainability and social responsibility. It underscores the pharmaceutical sector's dedication to delivering safe, high-quality medicines while minimizing its environmental and societal footprint.

### **2.2.8 Objective Two: The role of the upstream pharmaceutical policy framework of Ghana on the supply chain sustainability.**

In Ghana, the Pharmacy Council plays an important role in regulating the production, distribution and supply of drugs and medical products within the country. Again, access to necessary medications for everyone, quality assurance for all pharmaceuticals on the market, a functioning and efficient supply chain, and sensible use of medicines by professionals and patients are the main aims of Ghana's pharmaceutical policy. In the national health policy, there is also a commitment to enhance the domestic pharmaceutical sector, which is detailed under health industry. The overall legal framework for the pharmaceutical sector is set by the Food and Drugs Law from 1992, amended by Act 523 in 1996. It defines the role of the food and drugs board as separate entity under control of the Ministry of Health (MOH), responsible for regulating the sector. The Pharmacy Council is a statutory body established by an Act of Parliament, the Health Professions Regulatory Bodies Act (Act 857) to regulate the practice of Pharmacy in Ghana. Therefore, ensuring that pharmaceutical companies comply with operational standards and sustainable measures is the sole responsibility of the Pharmacy Council Ghana as supported by the Ministry of Health and the Ghana Health Service.

The pharmaceutical sector comprises producers of drugs (that is manufacturers), wholesalers, distributors, retailers, and consumers (Shree Bhagwati, 2016). The manufacturing pharmaceutical companies within Ghana are those who are largely engaged in the production of medicine and or drugs by using raw materials from the environment and society. Thus, these manufacturing concerns who are within the upstream pharmaceutical industry of Ghana contribute to sustainability of the supply chain. Meeting environmental, societal, and economic goals has been the main focus of a sustainable supply chain. But the attainment of these targets has eluded many companies within the supply chain in bringing goods and services to their final consumers within the Ghanaian health sector (Nsowah & Phiri, 2023; Adegoke et al.,

2021; Afum et al., 2020). The societal expectations on companies to protect the environment is becoming more intense and complex given the rise in several global pandemic and crisis. Demand for drugs during pandemics has increased from business-to-business level and business to customer demand (Crick & Crick, 2020). Pharmaceutical companies are therefore under intense pressure to produce and supply drugs on time to customers.

In the Pharmaceutical sector, sustainability issues take center stage (Zahiri, Zhuang & Mohammadi, 2017b). Regulations within different markets are placing pressure on pharmaceutical companies to become sustainable in production. Given the pressure to meet divergent demand within different markets, pharmaceutical companies must be seen to be responsive and strategize their production and supply chain practices to meet varied demands.

One of the most urgent business concerns for pharmaceutical businesses is supply chains, their interconnected operations, and management as the pharmaceutical sector's make-up and target markets become more and more worldwide. Partnerships between pharmaceutical businesses and logistic service providers are one of the most urgent challenges. The supply chains must be trusted to function at all points where they are connected, to produce value, and to satisfy the needs of the customer or patient. This requires that all parties involved have a clear knowledge of what is expected of them (Treves, 2015).

A common goal of the pharmaceutical value chain's components is ensuring that patients and consumers receive the right medication at the right time and from a convenient source. A complicated value chain, which includes the production of the drug, distribution to the dispensing point, and dispensing to the end-user, is necessary to ensure the achievement of these three key components (Treves, 2015).

Sustainable business practices are one of the biggest trends and factors influencing the design and management of supply chains because they are becoming more and more important to consumers, non-governmental and activist organizations, and governments around the world who are demanding that businesses operate ethically and appropriately through measures like legislation and changes in consumer behaviour (Treves, 2015).

Companies are now held more accountable for the effects of their actions, products, and services, as well as the associated supply chains, on the environment and the societies in which they are performed as a result of a combination of increased consumer awareness, demand for products made ethically, and regulatory standards over the past few decades. SCM now places

a strong emphasis on "green" and sustainability, as well as concerns relating to the environment and social responsibility.

In essence, businesses exist to generate money, but there is now a growing expectation that they be "socially responsible," and SCM plays a critical part in this by facilitating effective, efficient purchasing and production. Companies are generating better products, utilizing less resources, appealing to a bigger customer audience, and avoiding environmental laws thanks to socially responsible and sustainable business strategies. Such businesses are also able to keep ahead of rivals by pressuring rival governments to produce outcomes, make technological investments, or face harsh penalties.

In Ghana, essential medications are those that meet the criteria set forth in the National Drugs Policy Framework of 2004. These medications are obtained through public procurement procedures, which are governed by a number of acts and laws. They are delivered to the different regional medical stores (RMS) and healthcare institutions in the public and private sectors by the publicly owned central medical stores (CMS) for storage and distribution. All healthcare facilities are permitted to make purchases outside of the CMS as long as they meet a certain threshold amount under this procurement arrangement (Asamoah, Abor & Opare, 2011). It is generally known that there are issues with the security of health commodities and their supply systems, particularly in public institutions, and that these issues frequently restrict access, particularly to necessary medications like Artemisinin-based Combination Therapy (ACT). The lack of funding for health commodities, vertically controlled goods for public health programs, poor governance and administration, large debt owed to the CMS by RMS and hospitals and competing supply/distribution deficiencies and priorities are just a few of the issues that have been observed (Asamoah et al., 2011).

Even though there are many different sectors where malaria medications are supplied, including public, private, local drug stores, and on the streets, there is very little knowledge about integration and cooperation in this market. There is relatively little information available on the pharmaceuticals' supply, including distribution methods, interventions being used to affect availability and cost, supply chain mapping, and markups on costs. A number of projects for expanding access to ACT in particular might suffer significantly from the lack of data-driven market intelligence.

Primarily, supply chain policy frameworks are developed with the intent to ensure that goods and services are procured in a way that promote equity, fairness, competition, cost-savings, efficiency, and logical compliance to stated procurement standards within a country and on the international stage (Sarkar, Omair & Kim, 2020; Vicente et al., 2019). Ordinarily, a supply chain management policy framework is documented and contains minimum standards that all stakeholders within the supply chain must comply. A supply chain management policy framework is often binding on stakeholders.

Businesses, governments, consumers, and civil society organizations are increasingly focusing on sustainable supply chains, but they are not yet the rule. Over the past few decades, leading corporations have developed their supply chain sustainability strategies thanks to pressure from investors, NGOs, governments, and consumers.

The regulatory environment that affects supply chain sustainability is complicated and evolving quickly at the same time. Many businesses are interested in the corporate sustainability due diligence directive that the European Union has proposed. Debate on supply chain emissions coverage is being sparked by new guidelines that the Securities and Exchange Commission (SEC) has recommended regarding financial disclosures by US-listed companies related to climate change (World Economic Forum, 2022). While not always particular to supply chains, investor disclosure requirements on environment, social, and governance (ESG) do have an impact on businesses' strategies (World Economic Forum, 2022). The EU's Carbon Border Adjustment Mechanism (CBAM), the UK's plastic packaging tax, and the EU's efforts to promote the circular economy are just a few examples of the specific rules for different industries that will influence supply chain operations and decisions that are in the works (World Economic Forum, 2022).

Mapping the institutional and legal hierarchy that controls interactions between stakeholders and the market is one way to describe a pharmaceutical policy framework (Seiter, 2010). Some nations have a clear national drug policy or national pharmaceutical policy, which is often developed with consultation from stakeholders under the direction of the ministry of health (Aulakh et al., 2022; Seiter, 2010).

The rules and conditions under which the pharmaceutical industry functions are set forth in national legislation that is enacted by the legislative body (in the majority of nations, the parliament) (Aulakh et al., 2022; Seiter, 2010). Technical norms and rules for law

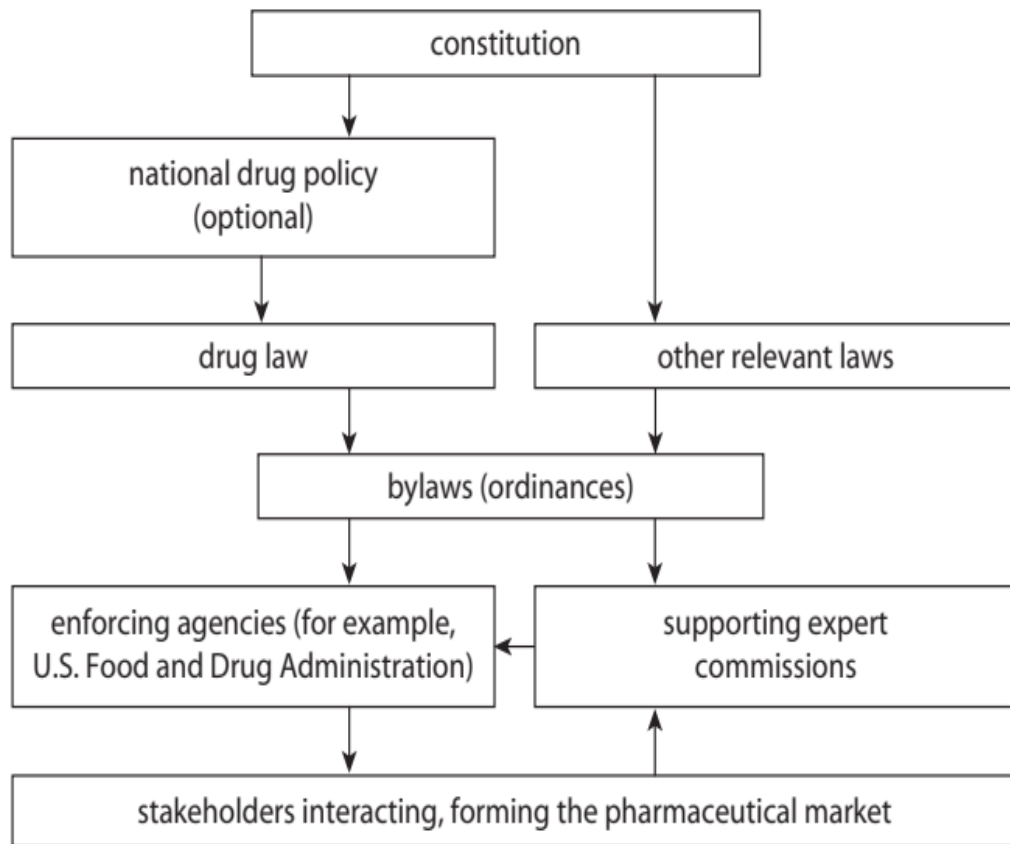
implementation are set forth by the executive branch (usually the ministry of health) through by-laws or ordinances. The framework for independent-led regulatory agencies may also be provided by the law. Most of the roles in standard-setting and technical implementation are then assumed by these agencies. Agencies responsible for enforcing the law and bylaws create all necessary administrative and technical procedures (Aulakh et al., 2022; Seiter, 2010).

Although the pharmaceutical market's supply-side factors (development, research, licensing of products and market participants, quality assurance, pricing, marketing, pharmacovigilance, and promotion) are typically governed by the drug law and its enforcing agencies, the demand side is governed by a different set of legislative instruments that specify who is responsible for paying for which medications under what circumstances (Seiter, 2010). Pharmaceutical supply chain policy includes laws governing health insurance or public health care systems. Drug purchases for public sector healthcare facilities may be governed by general procurement laws in systems with government-financed health care. The pharmaceutical industry may be impacted by other laws and regulations (such as antitrust laws, rules managing international commerce, or laws governing environmental protection), therefore policymakers must also take these into account when making decisions (Aulakh et al., 2022; Seiter, 2010).

The pharmaceutical industry is very dynamic and has many different stakeholders, all of whom are attempting to advance their own interests (Aulakh et al., 2022). Although laws offer a framework for decision-making, the actual choices almost always require technical input from specialists who may have different interpretations of the same evidence (Aulakh et al., 2022). Commissions are established to guide implementing agencies or act as decision-making bodies on their behalf in order to aid in decision-making in such a setting. The rules governing the drug legislation and other laws pertinent to the industry typically dictate how these commissions conduct their business (Aulakh et al., 2022).

Legislation sets the regulatory framework, but decision-making often involves expert analysis, leading to differing opinions. Commissions are commonly established to facilitate decision-making or act as decision-making bodies within this context. These commissions operate under the bylaws associated with drug laws and sector-specific regulations. This visual representation clarifies how different levels of regulations interact with agencies, shaping the industry's landscape. the pharmaceutical industry's intricacies necessitate commissions and regulatory structures for decision-making and compliance. Figure 2.4 depicts the hierarchy of laws, and

other forms of regulatory issues, that are implemented by agencies within the pharmaceutical sector.



**Figure 2. 6 Hierarchy of Laws, Regulations, and Implementing Agencies in the Pharmaceutical Sector.**

Source: Seiter (2010)

### **2.2.9 Objectives Three: Influence of upstream pharmaceutical sustainable supply chain management practices and company performance.**

The link between SSCM practices and company performance has been the focus of various research in the field of supply chain management over the past few years. Some researchers disagree with the concept of sustainable supply chains because they claim it has no bearing on how well companies function (Zhu & Sarkis, 2007) and suggests a duty to society and future generations that goes beyond what is required of businesses by law. Others, however, maintain the significance of SSCM procedures and their contribution to businesses' overall success (Baah & Jin, 2019; Hong et al., 2018; Wang & Dai, 2018). As a result, businesses use the SSCM process to manage all the supply chain participants as well as their own sustainable

management. To avoid and reduce the detrimental effects of the supply chain members on environmental and social responsibility, supply chain core firms should enhance environmental and social performance by internal as well as external SSCM (Wang & Dai, 2018).

A growing number of external stakeholders, including suppliers, consumers, shareholders, governments, non-governmental organizations (NGOs), and public agencies, are exerting increasing pressure on SSCM practices integration. Climate change, biodiversity loss, and child labour are just a few of the world's numerous prevalent environmental and socioeconomic problems. In reality, SCM entails significant processes including material procurement, production, storage, packaging, transportation, and recycling, all of which can have detrimental effects on the environment and society if improperly managed. Additionally, with the introduction of environmental regulations such as the Carbon Tax as well as standards and reporting frameworks like ISO 14000, SA 8000, and the Global Reporting Initiative, the duty of balancing the three dimensions of sustainability (social, environmental, and economic) of SCM has grown more complex (Varsei, Soosay, Fahimnia & Sarkis, 2014).

Upstream pharmaceutical SSCM practices have a significant influence on the performance of pharmaceutical companies (Sharma & Modgil, 2020; aus der Beek et al., 2016). Responsible sourcing of raw materials and active pharmaceutical ingredients (APIs) is crucial. Companies that engage in ethical sourcing are less exposed to supply chain disruptions caused by regulatory or reputational issues. For instance, a study by Beske and Seuring (2014) found that sustainable sourcing practices contribute to a more resilient supply chain, reducing risks associated with material shortages and regulatory compliance. Furthermore, environmental sustainability practices contribute to operational efficiency and cost reduction (Bai, Satir & Sarkis, 2019; Chin, Tat & Sulaiman, 2015). Companies that adopt green manufacturing and reduce waste not only minimize their environmental footprint but also often discover cost-saving opportunities (Lee & Ha, 2021; Beske, Land & Seuring, 2014). This efficiency translates into improved financial performance. In conclusion, upstream pharmaceutical SSCM practices directly impact the performance of pharmaceutical companies by enhancing supply chain resilience, reputation, operational efficiency, and cost savings. Embracing sustainability not only aligns with societal expectations but also positions pharmaceutical companies for long-term success in an increasingly environmentally and socially conscious market.

#### **2.2.10 Objectives Four: The role of top- management in ensuring upstream pharmaceutical sustainable supply chain management.**

Literature has demonstrated the importance of top management commitment within organizations and how this leads to several gains within the organization (Ahmed et al., 2021; Siagian et al., 2021; Yusliza et al., 2019). Practically, the top management theory and upper echelon theory provide some underpinnings to why top management are important to ensuring that strategy adoption and implementation, and overall organizational performance increases within an organization (Dubey, Altay, et al., 2018).

The pharmaceutical industry is a global organization that is responsible for manufacturing and distribution of medications to a country and beyond. Pharmaceutical sustainable supply chain management can be seen in five tiers (primary manufacturing, secondary manufacturing, main and local distribution centres and the final destination zones). SSCM may be considered as the effective and efficient management of associated environmental, social, and economic consequences in the construction and maintenance of global supply chains. SSCM promotes governance methods and policy that aim to decrease waste, assure long-term consistency, and economic value of environmental and social well-being for all stakeholders involved in the production and delivery of products and services at all levels of their lifecycles (Carter et al., 2020; Govindan, 2018; Diabat & Govindan, 2011). Although incorporating the rights and needs of all interested stakeholders in the market system into the decision-making process is a challenging task, it is to the long-term benefit of effectively managing supply chain relationships and corporate sustainability projects that eventually enable broad-based sustainable development objectives for the benefit of people, plants, and profits.

Managers of manufacturing firms and specifically pharmaceutical companies have a role to play when it comes to ensuring that the supply chain undertakes sustainable measures. Top Management Commitment to attaining increased performance outcomes has been identified in extant literature (Ahmed et al., 2021; Siagian et al., 2021; Yusliza et al., 2019). Top management commitment is regarded as essential to management initiatives. Top management facilitates employee empowerment, improved levels of job, and the adherence to industry standards.

Top management support is irrelevant in supply chain if the corporate culture of an organization is weak. Management support is critical in SCM (Hermano & Martín-Cruz, 2016). For firms to be more agile in their supply chain operation, a participative management style is essential.

Furthermore, a good communication, employee involvement and recognition, cross-functional interaction and committed managers are indications of participative management in SCM (Ilyas et al., 2020; Sajjad, Eweje & Tappin, 2020). Moreover, the top management support comes in the form of allocating resources, reward and time, supporting strategic purchasing, develop strategic supplier relationship and striving for information technology adoption (Menon & Ravi, 2021; Burki et al., 2018). In addition, communication, motivation, commitment and continuous implementation are the elements of top management support in supply chain quality management (SCQM) (Burki et al., 2018).

The magnitude of top management support in supply chain fields is vast. Apart from being financially supportive and setting up priorities, support from top management can come from psychological and behavioural support for employees who are resistance to change (Menon & Ravi, 2021; Burki et al., 2018). However, managerial complexity and poor vision from top management are barriers to successful supply chain integration (Ilyas et al., 2020; Burki et al., 2018). SCM is among top management agendas, but the inability to comprehend the need to support SCM is lacking.

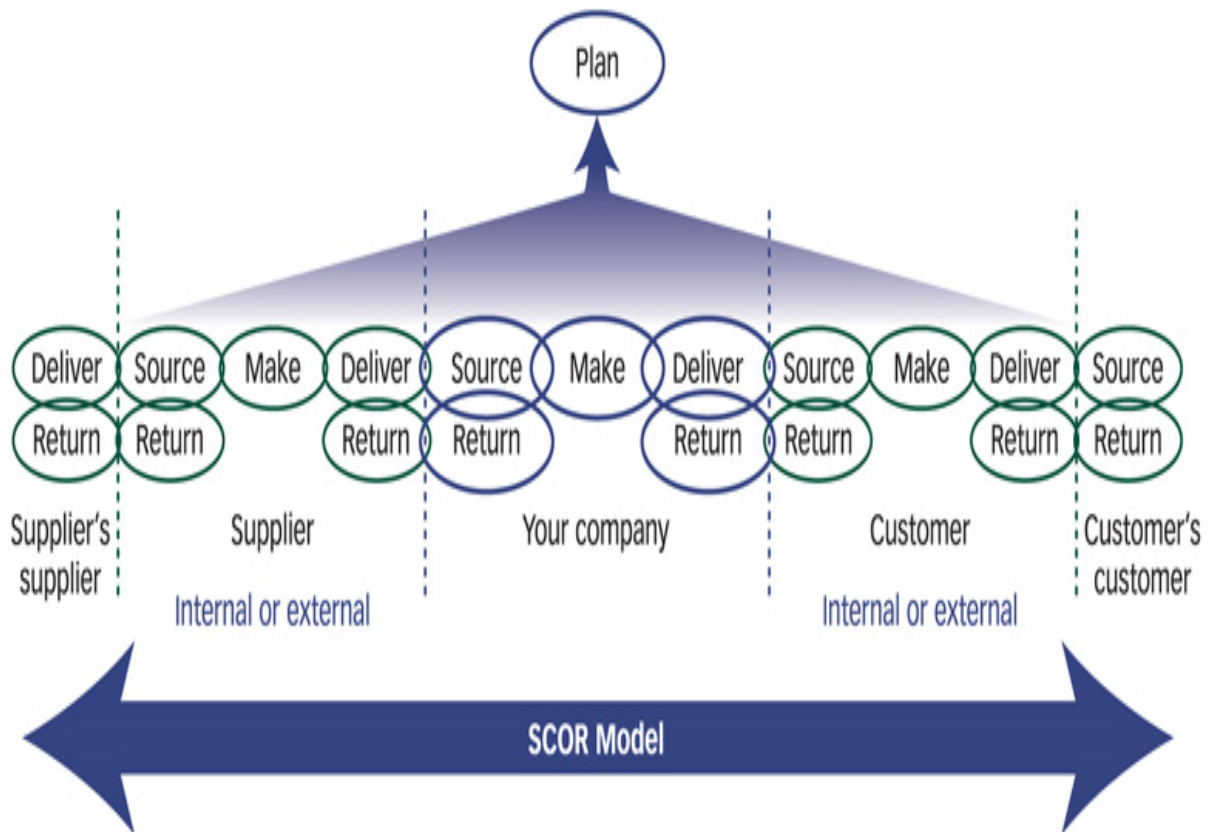
Top managers, namely the “CEO and its direct subordinates responsible for corporate policy”, act as important drivers in implementing diverse managerial practices that influence organizational performance (Burki et al., 2018; Hambrick, 2018). Top management plays an essential role in securing the required financial and personnel resources. They also have a critical role in the promotion of changes, which is important in the adoption of the organizational commitment to new values (Hambrick, 2018). Top management support has been examined in broad business sectors, including customer relationships, product development, information systems, and project success (Sajjad et al., 2020; Hambrick, 2018). When top managers value organizational learning and when it is shared through the organizational routine, infrastructure, and culture, this knowledge leads to high performance. Top management can never be underestimated since it creates a vision for the entire organization, which shapes corporate value, management direction, and the identity of the firm. In other words, top management leads the company at the forefront and implements resources or systems that are necessary for desired output (Sajjad et al., 2020; Hambrick, 2018). In the field of GSCM, top management support is widely treated as an essential driver for GSCM, facilitating resources and investment allocation into green practices (Neri, Pinnington, Lahrech & Al-Malkawi, 2019; Burki et al., 2018).

A lack of support from top management can result in higher resistance from the firm in incorporating institutional pressure and failure to adopt green production practices. The initiative from top management is one of the main driving forces for the companies to implement different kinds of environmental programs in the first place (Neri et al., 2019; Burki et al., 2018). Overall, top management support is necessary for environmental strategies and programs to succeed.

### **2.2.11 Supply Chain Operations Reference Model (SCOR model)**

The SCOR Model, or Supply Chain Operations Reference Model, is a meticulously crafted framework aimed at enhancing supply chain efficiency and effectiveness. It provides a standardized approach for systematically examining and managing supply chain operations, broken them down into key processes like Plan, Source, Make, Deliver, and Return. The model not only outlines these processes but also defines metrics and best practices for optimal execution. It is widely used across industries to benchmark and improve supply chain performance, leading to cost reduction and overall operational enhancements. The SCOR model is a process reference framework developed by the Supply Chain Council which is now part of American Production and Inventory Control Society (APICS) that plays a significant role in advancing best practices and standards in the field of supply chain and operations management and provides a comprehensive structure for analyzing and improving supply chain operations (APICS, 2017; Zhou, Benton, Schilling & Milligan, 2011). It defines a set of standard processes, metrics, and best practices that enable organizations to assess, benchmark, and optimize their supply chain performance (Ríos, Duque & Gómez, 2019; APICS, 2017; Li, Su & Chen, 2011).

The SCOR model is structured around five primary process categories: Plan, Source, Make, Deliver, and Return. These categories encompass the core activities involved in managing a supply chain, including strategic planning, procurement, production, logistics, and reverse logistics. Each process category is further divided into detailed process steps, performance metrics, and best practices, allowing organizations to evaluate their current practices, identify areas for improvement, and align with industry standards (Ricardianto et al., 2022; Ríos et al., 2019). Figure 2.5 illustrate Supply Chain Operations Reference Model (SCOR model) offers a valuable framework for integrating sustainability considerations into supply chain management.



**Figure 2. 7 SCOR Model**

Source: APICS (2017) and Anand (2017)

In the context of sustainable supply chains, the SCOR model offers a valuable framework for integrating sustainability considerations into supply chain management. Sustainability in supply chains involves addressing social, environmental, and economic impacts across the entire value chain to achieve long-term viability (Saen & Izadikhah, 2022; Jain et al., 2022; Azevedo, Pimentel, Alves & Matias, 2021). The SCOR model can be adapted to incorporate sustainability-focused processes, metrics, and best practices, enabling organizations to enhance their environmental stewardship, social responsibility, and economic performance (Saen & Izadikhah, 2022; Azevedo et al., 2021).

For instance, within the Plan category, sustainable supply chain practices may include the development of environmentally friendly product designs, the integration of social and environmental criteria into supplier selection processes, and the inclusion of sustainability goals in strategic planning (Saen & Izadikhah, 2022; Azevedo et al., 2021). In the Source category, organizations can consider factors such as responsible sourcing, supplier diversity, and supplier engagement on sustainability issues. In the Make and Deliver categories, sustainable practices

may involve energy-efficient manufacturing processes, green packaging, transportation optimization, and carbon footprint reduction. Finally, the Return category encompasses activities related to product take-back, recycling, and the circular economy (Jain et al., 2022; Saen & Izadikhah, 2022).

By aligning with the SCOR model and incorporating sustainability considerations, organizations can improve their overall supply chain performance while addressing social and environmental concerns. The SCOR model's emphasis on metrics and benchmarking allows organizations to track their progress, compare their performance with industry peers, and identify areas for further sustainability improvement (Jain et al., 2022; Saen & Izadikhah, 2022; Azevedo et al. 2021). The next section provided a thorough discussion of the theory that underpins the study.

### **2.3 Theory Adopted**

This section presents the study's theoretical foundations and their significance. The section focused on applying Upper Echelon Theory to illuminate sustainable supply chain management practices in the upstream pharmaceutical supply chain while also striving to integrate various theories to construct the study's conceptual framework.

#### **2.3 Upper Echelon Theory**

Donald C. Hambrick and P. Mason presented the upper echelons theory as a management theory in 1984 (Hambrick 2018; Hambrick & Mason 1984). It claims that the managerial background traits of the top-level management team can predict organizational outcomes in part. The theory emphasizes how top-level management team members' managerial backgrounds may help predict organizational results to some extent. Performance within the organizational setting is heavily influenced by the ideals, knowledge, and traits of top managers (Kim, 2021; Díaz-Fernández et al., 2020; Tran & Pham, 2020). The idea that organizational results are better understood as the consequence of collective decision processes rather than individual action is one of the supporting notions in Hambrick and Mason's (1984) paper, which is generally seen as crucial to the upper echelons theory (Hambrick, 2018). Extant literature has shown that upper echelon theory relies on two pillars: CEO experience and CEO personality (Tran & Pham, 2020; Hambrick, 2018).

The core tenet of the Upper Echelon Theory is that top executives, including their experiences, values, personalities, and other human traits, shape an organization's strategic decisions and

behaviors (Kim, 2021; Díaz-Fernández et al., 2020; Hambrick, 2018). It asserts that these executives view strategic issues through their personalized lenses, leading to organizational outcomes being influenced by the unique interpretations of these top managers. The theory also emphasizes the significance of the top management team (TMT) as a collective decision-making unit in understanding organizational outcomes.

The Upper Echelon Theory has been applied in various contexts, including human resource management, analyzing competitors or listed companies, and predicting future strategic decisions of CEOs (Díaz-Fernández et al., 2020; Hambrick, 2018). It is often used in the context of organizational and employee performance, offering insights into how the traits and characteristics of top managers affect a company's direction and outcomes. The theory has also expanded to consider situational variables, such as firm and environmental characteristics (Kim, 2021; Hambrick, 2018).

Understanding and applying the Upper Echelon Theory can provide several benefits. It helps in predicting and explaining organizational outcomes, particularly in terms of strategy formulation and execution (Díaz-Fernández et al., 2020; Dubey, Gunasekaran, et al., 2018). The theory offers insights into the impact of CEO and TMT traits on decision-making processes and performance. Additionally, it underscores the importance of top management commitment in organizations, which can lead to various advantages, including enhanced performance and strategic implementation (Dubey, Gunasekaran, et al., 2018; Hambrick, 2018). The Upper Echelon Theory is chosen for the current study to serve as a moderator of high-performance outcomes in the context of sustainable supply chain practices. This choice is likely motivated by the theory's emphasis on how top management characteristics influence organizational decisions and behaviours, which can be highly relevant when studying the adoption and impact of sustainable supply chain practices. The study intends to investigate how the traits and characteristics of top management, as discussed in the theory, moderate or influence the success of sustainable supply chain practices within the pharmaceutical industry. The theory may be used to analyze how the personalized lenses through which top managers view strategic issues impact the adoption and implementation of sustainability initiatives and, consequently, organizational performance.

## **2.4 Conclusion**

In summary, companies focusing on sustainability often prioritize the Triple Bottom Line (TBL), considering economic, social, and environmental factors equally in their decision-

making. SSCM integrates these TBL aspects, becoming vital for industry success and sustainability. The SCOR model, a comprehensive process framework, offers structure for analyzing and enhancing supply chain operations. Incorporating sustainability into this model improves environmental responsibility, social ethics, and economic performance. The pharmaceutical supply chain is a prime example where sustainable practices can make a significant impact, from responsible sourcing to ethical manufacturing. Effective management of this supply chain enhances product quality, reduces costs, and benefits both the business and end users. Top management's commitment is crucial in upstream pharmaceutical sustainable supply chain management. Their support fosters a sustainability culture, allocates resources, and drives change. Top management, coupled with effective communication and resource allocation, facilitates successful sustainable supply chain implementation. Overall, sustainable supply chain management is vital in modern business, and the SCOR model offers a framework for integration. The pharmaceutical supply chain exemplifies how sustainability can enhance performance, and top management commitment is essential in driving sustainable practices, aligning with the upper echelon theory. This commitment is critical for adopting and implementing sustainable supply chain practices, promoting long-term viability, environmental responsibility, and positive social impact. The chapter underscores the vital role of top management in driving sustainable supply chain initiatives, setting the stage for hypothesis development and testing in the next chapter through empirical review according to research objectives.

## CHAPTER THREE

### EMPIRICAL REVIEW AND HYPOTHESES DEVELOPMENT

#### 3.1 Introduction

The focus of this chapter is to develop the research hypothesis and construct a research framework conceptualizing SSCM practices within the pharmaceutical industry. Drawing from the foundations of the Upper Echelon Theory, the chapter underscored the pivotal role of top management in shaping organizational strategies and practices, specifically in the domain of SSCM. The discussion of extant empirical studies and the development of hypotheses are considered under this section of the study. Generally, the empirical study considers studies undertaken across the globe, those that were done in African, and finally studies in Ghana so as to carefully situate the discussion on the research objectives. The theoretical framework forms the bedrock for the investigation into the relationship between top management, SSCM practices, and organizational performance in the pharmaceutical sector. The research objectives encompass a comprehensive assessment of how SSCM practices influence organizational performance, a deep understanding of the impact of top management commitment in driving these practices, and an exploration of how top management can potentially act as a moderator, enriching the connection between SSCM practices and performance outcomes. The chapter is organized into distinct sections: initially, empirical review was done considering studies undertaken across the globe, those that were conducted in African, and finally studies in Ghana an in-depth review of SSCM predictor variables was conducted, encompassing all the SSCM indicators and Top Management Commitment (TMC), with an exploration of their influence on organizational performance. Subsequently, the study delved into examination of the upstream pharmaceutical SSCM practices as a predictor variable, analyzing its impact on the performance of the pharmaceutical industry. Following this, we embark on an empirical review, investigating the moderating roles of top management in the relationship between sustainable supply chain practices, and high-performance outcomes within the pharmaceutical manufacturing industry. In conclusion, drawing valuable insights from our empirical reviews, the study formulated a comprehensive conceptual model encapsulating the intricate relationships and dynamics explored throughout this chapter.

#### 3.2 Empirical Review

### ***3.2. 1 Global Perspectives***

The literature on the topic of sustainable supply chain management has provided meaningful insights. Various authors have continued to examine sustainability in supply chains and the ramifications for sustainability performance (Hong et al., 2018; Wang & Dai, 2018; Varsei et al., 2014). The empirical examination cuts across case studies, field research, quantitative modeling, conceptual modeling, surveys, and theory-driven studies (Kuwornu, Khaipetch, Gunawan, Bannor & Ho, 2023; Das & Hassan, 2022; Baliga, Raut & Kamble, 2020). The research article by Mehralian et al. (2015) develops an agile pharmaceutical supply chain model to efficiently manage the risks in pharmaceutical supply chains. The authors used the SCOR model to analyze the three parts of a pharmaceutical supply chain i.e., the supply of Active Pharmaceutical Ingredients (APIs), Finished Dosage Form (FDF) manufacturing and the distribution processes. The main findings of the article include the list of factors affecting agility in the different stages of the pharmaceutical supply chain. A list of seven factors were identified under each part, which affects the supply chain agility. Among these seven factors, the most important factors affecting agility were identified as delivery speed, cost reduction, market research and quality (Mehralian, Zarenezhad & Ghatari, 2015).

Mousazadeh et al. (2015) develop a bi-objective mixed integer linear programming (BOMILP) model to solve a network design problem in pharmaceutical supply chains. The model developed by the authors assisted in strategic decision making concerned with the opening of manufacturing and distribution centers permitting optimal material flows. The main aim of the model was to minimize the total costs and satisfy the consumer demand for the drug (Mousazadeh, Torabi & Zahiri, 2015).

The study conducted by Huq et al. (2016) explained that the configuration of pharmaceutical supply chains has an impact on the performance of pharmaceutical firms. The author focused on the supply chain related disturbance factors to be considered when configuring supply chains. In the article, they used a multi-phase, mixed-methods approach to identify five important disturbance factors. The factors identified by the authors were quality defects, interruptions in manufacturing processes, difficulties in order processing, delay in product delivery and supplier's inability to respond to market demand. All the factors identified by the authors were supplier related disturbance factors (Huq et al., 2016).

The research conducted by Jaberidoost et al. (2013) also focused on identifying the risks in pharmaceutical supply chains. The authors used databases such as Scopus, PubMed, Web of

Science and search engines to collect literature studies in the field of pharmaceutical supply chains. A systematic review of these articles led to identifying 50 main risks and categorized them in to seven categories such as supplier issues, strategy issues, financial, logistic, political, regulatory and market issues. The paper concludes that most of the risks identified in the study were internal risks caused by people, processes and functions mismanagement (Jaberidoost, Nikfar, Abdollahiasl & Dinarvand, 2013).

The article by Lucker and Seifert (2017) analyzed three risk mitigation strategies, dual sourcing, agility capacity and Risk Management Information (RMI). The authors used a mathematical modelling methodology to model the supply chain of a pharmaceutical firm. The model was based on lowering the total costs incurred by the pharmaceutical firm exposed to disruption risks over a one-year period. The results from the modelling suggested that dual sourcing was a better strategy to reduce long disruption times. They further conclude that RMI and agility capacity strategies can be used as substitutes by the firm when dual source of supply is unavailable (Lücker & Seifert, 2017).

Capo et al. (2014) understood the different business strategies in pharmaceutical supply chains by observing a network of pharmaceutical firms in the supply chain. The authors followed a case study methodology in their research by studying four different pharmaceutical firms. They conducted semi-structured interviews to understand the different business models adopted by pharmaceutical firms. The study claimed that pharmaceutical firms were unable to generate value with their current business models in the long run, owing to changing market environments. The article concludes that firms should restructure their business models, involving universities, government and industry actors to ensure an overall functioning of the system (Capo et al., 2014).

Reefke and Sundaram (2017) used a Delphi approach to identify central themes across planning, collaboration, execution, and coordination categories that were relevant to SSCM research and practice for theory building and managerial insights. That said, the categorizations of supply chain sustainability risks and central themes by Giannakis and Papadopoulos (2016) and Reefke and Sundaram (2017) cannot be generalized given that data were obtained from two developed European contexts as well as perspectives from European and North American experts (Reefke & Sundaram, 2017).

Pereseina et al. (2014) examined sustainable supply chain management challenges and conflicts using a company as a case study with operational offices located in an emerging country, China. They found that the challenges in implementing sustainable supply chain management practices include the focus on short-term economic gains, the organizational culture that trivializes sustainability, lack of stakeholder commitment, and weak governmental regulations (Pereseina, Jensen, Hertz & Cui, 2014).

In a survey of the pharmaceutical industry in 2013, PricewaterhouseCoopers (PwC) surveyed over 500 supply chain executives, including those involved in the pharmaceutical industry, on the future trends in supply chains and SCM. The survey discovered that majority of pharmaceutical companies manage the planning, operational procurement and delivery functions of their supply chains regionally, and their enabling, manufacturing and assembly and strategic procurement functions globally. Approximately 6% of planning and sourcing activities; a relatively high 25% of new product development activities; and between 20%-40% of delivery functions were outsourced. In terms of supply chain performance, the study indicated the leading pharmaceutical companies on average achieve Earnings Before Interest and Tax (EBIT) margins of 16.9%; Inventory Turnovers of 16,3 and delivery performance of an impressive 97,4%.

In a separate survey of Global Pharmaceutical Companies Chief Executive, PwC found that respondents advancement in technology was pivotal factor that help in ensuring innovation within the pharmaceutical sector. Other significant issues affecting the sector were regulatory focus and business integrity; and the battle for talent, particularly with changing consumer/patient demographics and shifts in wealth with 72% of respondents believing this movement will have a significant transformational effect on their business. Innovation and intellectual property are also key priority areas and 38% of respondents stated that they had completed or in the process of changing their R&D and innovation strategies to manage future business transformation (PriceWaterHouseCooper, 2014).

### **3.2.2 Ghana in Context**

Asamoah, Abor and Opare (2011) examined the pharmaceutical supply chain for artemisinin-based combination therapies in Ghana. This study employed an inductive approach in examining the dynamics of the pharmaceutical supply chain. The study also used analytical hierarchical process in identifying factors that are detrimental to artemisinin-based combination therapies (ACT) supply chain. The study revealed that there are basically two main supply

channels through which ACT enters the Ghanaian pharmaceutical system – private and public. The ACT network depicts a strong evidence of actor interdependence and long-term relationships. However, the key supply chain enabler – the use of information technology – was found to be lacking, leading to delays and disruptions in the supply chain system. Disruption was found to be the main detrimental factor to the supply chain although delay was found to be occurring more frequently. Price increases indicated a low effect on the supply network at the pharmacy level, but the general price of the highly subsidized effective ACT remains very high.

Acquah, Agyabeng-Mensah and Afum (2021) assessed the link among green human resource management practices, green supply chain management practices and performance. The study explored the influence of green human resource management and green supply chain management practices on operational, market, financial, social and environmental performances. The study used partial least square–structural equation modeling approach to analyze data gathered through structured questionnaires from supply chain and human resource managers in manufacturing and hospitality firms in Ghana. It is established that green supply chain management practices play complementary partial mediating role between green human resource management and operational, market, social and environmental performances, while it plays competitive partial mediating role between green human resource management and financial performance. Subsequently, the analysis revealed that the synergy between green human resource management and green supply chain management creates the highest value in operational performance, followed by market performance, environmental performance, financial performance and social performance. The critical question that arises is; how does a pharmaceutical company ensure adequate supply chain sustainability practices to satisfy varied demands for its products? Based on the foregoing, this study leveraged on the understanding of upper echelon theory (Díaz-Fernández et al., 2020; Hambrick, 2018) to examine how managers could contribute to the attainment of sustainable supply chain practices within the upstream pharmaceutical industry in Ghana.

### **3.3 Hypotheses Development**

This section focused on the development of hypotheses to explore the relationships between key constructs in the research framework. Specifically, the study investigated the impact of SSCM practices, top management commitment, and their impact on the performance of the pharmaceutical industry, with a particular emphasis on upstream pharmaceutical SSCM practices in Ghana.

The first hypothesis centers on the research's third objective in chapter 1 to assess how upstream pharmaceutical SSCM practices impact the pharmaceutical industry's performance in Ghana. In the realm of SSCM some elements that drive the adoption of SSCM practices, such as Operational Practices (OP), Supply Chain Integration (SCI), Environmental Management Practices (EMP), Socially Inclusive Practices for Employees (SIPE), Socially Inclusive Practices for the Community (SIPC), Environmental performance (EPR), Operations performance (OPR), Community-centered social performance (CSP), and Top Management Commitment (TMC). Top management commitment and support from various levels of the organizations are essential for successful organization performance.

Existing research and empirical evidence support this perspective, highlighting the critical role of top management commitment.

The fourth objective of the study also examined the potential moderating effects of top management commitment on the relationship between SSCM practices and performance outcomes. The study recognized that top management commitment can influence the effectiveness of SSCM practices in delivering performance improvements. To explore these further, the study formulated hypotheses that consider the contingent nature of these relationships, acknowledging that different organizations and contexts may yield varying results. The study recognizes that SSCM adoption is influenced by a combination of external pressures, such as regulatory compliance, and internal drivers, including top-level management commitment.

This section lays the groundwork for empirical investigation by formulating hypotheses based on theoretical foundations and empirical evidence. These hypotheses were designed to deepen our understanding of how top management commitment, SSCM practices, and their interplay influence the performance of pharmaceutical companies in the context of sustainability.

In addressing research objectives 3 and 4, the study formulated hypotheses to enhance understanding of how top management commitment, SSCM practices, and their interactions influence the performance of pharmaceutical companies in the sustainability context. Our third research objective was to assess how upstream pharmaceutical Sustainable Supply Chain SSCM practices impact the pharmaceutical industry's performance in Ghana. In the realm of SSCM, various indicators are adopted in response to external regulations and internal motives. These practices aim to reduce a product's environmental impact without significantly increasing

costs by minimizing materials use, waste generation, emissions, energy consumption, and excess inventory. Consequently, implementing SSCM practices is expected to positively affect performance. These hypotheses will guide our research in examining the impact of SSCM practices and the moderating role of Top Management Commitment on performance outcomes in the pharmaceutical industry in Ghana.

### ***3.3.1 Link between SSCM practices and Operations practices***

By analyzing a network of pharmaceutical companies in the supply chain, Capo et al. (2014) investigated the various business strategies in pharmaceutical supply chains. The authors conduct their research using a case study technique, looking at four distinct pharmaceutical companies. They used semi-structured interviews to better understand the various business strategies used by pharmaceutical companies. According to the report, due to shifting market conditions, pharmaceutical companies were not able to produce value using their present business strategies in the long term. In order to guarantee the system as a whole function, the article's conclusion was that businesses should reorganize their business models and involve universities, the government, and industry actors (Capo et al., 2014).

Pagell, and Wu (2009) examined the relationship between operations practices and supply chain practices using data from 407 manufacturing firms in the United States. The study found that firms that adopted advanced operations practices, such as lean production and total quality management, were more likely to adopt advanced supply chain practices, such as supplier collaboration and supply chain flexibility (Pagell & Wu, 2009). Hani (2021) investigated the moderating role of lean operations on the relationship between supply chain integration and operational performance in Saudi manufacturing organizations. The study also found that lean operations play a moderating role in the relationship between supply chain integration and operational performance. Specifically, the positive relationship between supply chain integration and operational performance was stronger when firms adopted lean operations practices. This suggests that firms that integrate their supply chain activities and adopted lean operations practices were more likely to achieve better operational performance (Hani, 2021). The study by Yang, Hong and Modi (2011) examined the relationship between lean manufacturing, environmental management, and business performance in manufacturing firms. The empirical research finding of this study highlights the positive impact of integrating lean operations practices and environmental initiatives on overall business performance. The study by Das (2018) with focus on sustainable supply chain management and firm performance

confirmed that operations practice is a positive indicators of sustainable supply chain management practices. Based on the foregoing, it is postulated that:

*H1a: Operational practices is a proxy for sustainable supply chain management.*

### **3.3.2 Link between SSCM practices and Supply chain integration**

The study by Saragih et al. (2020) focused on examining the relationship between supply chain operational capability, supply chain operational performance, supply chain management, and supply chain integration. The objective was to understand how these components interact and influence each other in the context of supply chain management. The researchers employed a quantitative research approach and collected data from various supply chain professionals and managers. They conducted a thorough analysis to explore the connections and effects of supply chain operational capability, operational performance, management, and integration. The study uncovered significant findings indicating a strong positive relationship between supply chain operational capability and operational performance. It highlights that an organization's ability to effectively manage and enhance its supply chain operations directly correlates with improved operational performance. Moreover, supply chain management and integration were found to play crucial roles in mediating this relationship, emphasizing their importance in achieving optimal operational outcomes within the supply chain (Saragih, Tarigan, Silalahi, Wardati & Pratama, 2020). Dhaigude, Kapoor, Gupta and Padhi (2021) investigated the association among supply chain integration, supply chain orientation and performance. The study found that supply chain integration (SCI) had a significant positive association with supply chain performance. Another study by Afshan, Mandal, Gunasekaran and Motwani, (2022) examined the association that occur between supply chain integration and financial performance using immediate performance outcomes as a mediator. A significant positive association was found between SCI and financial performance. The study by Das (2018) further consolidated the knowledge on supply chain integration as an indicator of sustainable supply chain management. This current study therefore advances that:

*H1b: Supply chain integration is a proxy for sustainable supply chain management.*

### **3.3.3 Link between Link between SSCM practices and Environmental management practices**

The design of pharmaceutical supply chains has an effect on the success of pharmaceutical enterprises, according to research by Huq et al. (2016). The author focused on supply chain-related disruption issues that should be taken into account while setting up supply chains. Five

significant disruption variables have been identified using a multi-phase, mixed-methods approach in the article. The authors listed quality issues, delays in production, problems processing orders, delays in product delivery, and suppliers' failure to meet market demand as contributing reasons. The factors listed by the authors were all connected to the disruption of the suppliers (Huq et al., 2016). In order to effectively control the risks in pharmaceutical supply chains, Mehralian et al. (2013) designed an agile pharmaceutical supply chain model. The supply of active pharmaceutical ingredient API, the production of Finished Dosage Form (FDF), and the distribution procedures are the three components of a pharmaceutical supply chain that the authors analyze using the SCOR model. The list of variables influencing agility at various points in the pharmaceutical supply chain was one of the article's primary conclusions. Under each section, a list of seven variables that influence supply chain agility was established. The four most significant characteristics that impact agility out of these seven were found to be delivery speed, cost reduction, and quality (Mehralian et al. 2015). There was substantial empirical evidence that environmental management practices (EMPs) positively impact supply chain performance. Das (2018) found that EMPs had no significant association with operational performance. However, in a study Yang, Han, Zhou and Yuan (2015) the association between environmental management practices and innovation performance was found to be significantly positive. A study by Zhu and Sarkis (2004) found that implementation of EMPs, such as pollution prevention, waste reduction, and product design for the environment, led to improved supply chain performance in terms of cost, quality, delivery, and flexibility. Pagell and Wu (2009) found that firms with higher levels of environmental performance had higher financial performance than their peers. This suggests that EMPs can lead to improved financial performance through improved supply chain performance. Overall, the empirical evidence suggests that EMPs can lead to improved supply chain performance, which can in turn lead to improved financial performance. Firms should consider implementing EMPs as a way to enhance their supply chain performance and gain a competitive advantage.

*H1c. Environmental management practices is a proxy for sustainable supply chain management.*

### **3.3.4 Link between SSCM practices and socially inclusive practices for employees**

Research suggests that socially inclusive practices for employees can have a positive impact on supply chain performance. For example, a study by Klassen and Vereecke (2012) found that fair labour practices and social sustainability initiatives led to improved supplier performance

in terms of cost, quality, delivery, and flexibility. Another study by Beske and Seuring (2014) found that socially responsible human resource management practices positively impacted supplier performance in terms of quality, delivery, and innovation. In addition, socially inclusive practices can lead to improved employee motivation and productivity, which can translate into improved supply chain performance. A study by Siegel & Vitaliano (2007) found that socially responsible practices, such as fair labour practices and employee training, led to improved employee satisfaction, which in turn led to improved business performance. However, it is important to note that the impact of socially inclusive practices on supply chain performance may vary depending on the industry and context. The impact of social sustainability initiatives on supply chain performance was stronger in industries with higher customer pressure for sustainability. Das (2018) provided empirical evidence for socially inclusive practices for employees in his study where the association between sustainable supply chain management and firm performance was examined. Overall, the empirical evidence suggests that socially inclusive practices for employees can positively impact supply chain performance, particularly in industries with high sustainability pressures. Therefore, this study hypothesizes that;

*H1d. Socially inclusive practices for employees is a proxy for sustainable supply chain management.*

### ***3.3.5 Link between SSCM practices and socially inclusive practices for community***

Socially inclusive practices in supply chains have been found to have a positive impact on supply chain performance, as evidenced by several studies. For instance, Ozbay and Ertürk (2020) found that companies that prioritize diversity and inclusion in their supply chains see improved financial performance. The study analyzed data from over 11,000 firms and found that those with more diverse supply chains had higher sales revenue, more customers, and greater profitability. In addition, socially inclusive practices can help companies mitigate supply chain risks. According to Waddock and Bodwell (2004), companies with diverse and inclusive supply chains were better able to navigate disruptions such as natural disasters and geopolitical conflicts (Waddock & Bodwell 2004). The Harvard Business Review also conducted a study that analyzed data from over 2,000 firms and found that companies with more diverse supply chains were better able to mitigate supply chain risks (Carter & Rogers 2008). The empirical study by Das (2018) further provides a strong understanding of how socially inclusive practices for community by firms contributes to the incorporation of

sustainable supply chain within their operations. Companies that prioritize diversity and inclusion in their supply chains are more likely to see improved financial performance, mitigate supply chain risks, and improve brand reputation and customer loyalty. Consequently, this study hypothesized that;

*H1e: socially inclusive practices for community is a proxy for sustainable supply chain management.*

### **3.3.6 Link between sustainable supply chain management (SSCM) practices and SSCM performance outcomes.**

Wang and Dai (2018) investigated the impact SSCM practices on performance in Chinese firms. Using both internal and external dimensions of SSCM practices, the study examined the impact on corporate performance. Data was collected from 172 Chinese firms. For analysis, structural equation modeling technique was used. The study found that the internal SSCM practices had a significant positive impact on the performance of firms, that is on both social and environmental performance. Zailani et al. (2012) conducted a survey-based study on SSCM in Malaysia. The research investigated the extent and practices of SSCM among Malaysian firms. The findings revealed a growing awareness of SSCM and its importance for business sustainability. The results empirically prove that SSCM practices have a positive effect on sustainable supply chain performance, particularly from the economic and social perspective (Zailani, Jeyaraman, Vengadasan & Premkumar, 2012). Hong et al. (2018) investigated the interplay of SSCM practices, supply chain dynamic capabilities, and enterprise performance. Through a study of manufacturing firms, the research underscored the positive connection between SSCM practices and supply chain dynamic capabilities. These dynamic capabilities, in turn, contribute to enhanced enterprise performance. The findings emphasize the strategic significance of integrating sustainability practices into supply chain operations, fostering adaptability and innovation that drive positive business outcomes (Hong et al., 2018). Based on the foregoing, this study posits that;

*H1: There is a significant relationship between sustainable supply chain management (SSCM) practices and SSCM performance outcomes.*

### **3.3.7 Top-management commitment moderating the relationship between sustainable supply chain management (SSCM) practices and SSCM performance outcomes**

The choices made by senior management within organizations have the greatest impact as senior managers controls and direct activities such as resource allocation and deployment (Xu

& Zhao, 2022b; Sandberg & Abrahamsson, 2010). The activities of resource allocation and development contribute to changes in environmental policy. On the other hand, lack of backing from senior management may cause the company to reject institutional pressure and fail to implement sustainable production and distribution methods. One of the primary impetuses for businesses to execute various environmental initiatives in the first place is the initiative from senior management (Kitsis & Chen, 2021; Siagian et al., 2021). Rachmat Hidayat et al. (2020) explored the influence of auditor commitment on supply chain performance, considering the moderating role of supply chain top management support. Their study focused on a specific context, and investigated how auditors' dedication affects supply chain outcomes. The research revealed that a higher level of auditor commitment positively correlates with improved supply chain performance. Additionally, the presence of strong support from supply chain top management enhances this relationship. The study underscored the significance of both auditor involvement and top management support in shaping supply chain effectiveness within the examined framework (Rachmat Hidayat, Azis, Yunizar & Amzal, 2020). Overall, the success of environmental plans and initiatives depends on top management support. Sustainable supply chain management practices will trigger higher performance when top management devote time, resources and expertise at their disposal. The greater the top management commitment to driving the agenda of SSCM, the higher anticipated overall performance of the firm (Kitsis & Chen, 2021; Ilyas et al., 2020; Chu, Yang, Lee & Park, 2017). Based on the foregoing, it is posited that:

*H2: Top-management commitment moderates the relationship between sustainable supply chain management (SSCM) practices and SSCM performance outcomes.*

*H3: Top-management commitment mediates the relationship between sustainable supply chain management (SSCM) practices and SSCM performance outcomes.*

### ***3.3.8 Linkage of top management commitment and pharmaceutical sustainable supply chain management performance***

Managers of manufacturing firms and specifically pharmaceutical companies have a role to play when it comes to ensuring that the supply chain undertakes sustainable measures. Top Management Commitment to attaining increased performance outcomes has been identified in extant literature (Plöckinger et al., 2016a; Ting et al., 2015a). Top management commitment is regarded as essential to management initiatives. Top management facilitates employee empowerment, improved levels of job, and adherence to industry standards. Chu et al. (2017)

studied institutional pressures in the adoption of green supply chain management, the role of top management in driving firm performance. Data was collected via electronic means from manufacturing companies in Korea. A total of 241 key informants from these firms were selected. Structural equation modelling approach was used for the data analysis. The study found that top management support positively influences the adoption of green supply chain management. Dubey et al. (2015) employ mixed methods research to investigate enablers of GSCM. The study delved into factors that facilitate the adoption and implementation of environmentally friendly practices within supply chains. Through a comprehensive approach, combining qualitative and quantitative insights, the research identified key enablers such as stakeholder collaboration, technology integration, and regulatory support. The findings emphasized the multifaceted nature of GSCM and provided a nuanced understanding of the factors that contributed to the successful implementation of sustainable practices within supply chain operations. In particular, the study found that top management commitment plays a significant role as an enabler for increased financial and environmental performance (Dubey, Singh & Gupta, 2015). It is therefore postulated that;

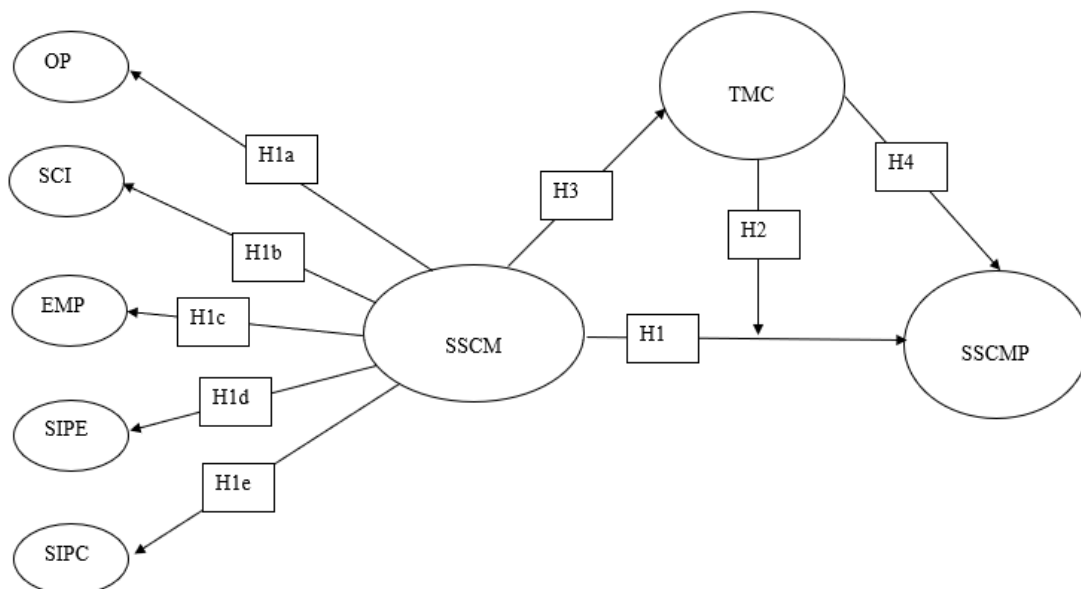
*H4: There is a significant relationship between top management commitment and pharmaceutical sustainable supply chain management performance.*

### **3.4 Conceptual Framework**

Managers of manufacturing firms and specifically pharmaceutical companies have a role to play when it comes to ensuring that SSCM practices are implemented in their organizations. Top Management Commitment to attaining increased performance outcomes has been identified in extant literature as a major catalyst for the adoption and implementation of SSCM practices in a manufacturing organization (Plöckinger, Aschauer, Hiebl & Rohatschek, 2016b; Ting, Azizan & Kweh, 2015b). Top management commitment is regarded as essential to management initiatives. Top management facilitates employee empowerment, improved levels of job, and the adherence to industry standards.

This study proposes that pharmaceutical sustainable supply chain management practices lead to increased performance. Therefore, top management commitment is portrayed as a moderating variable. The conceptual model shows the relationship between pharmaceutical sustainable supply chain management practices (as the independent variable), Top Management Commitment (as mediating variables), and performance outcomes (as a

dependent variable). Managers of manufacturing firms and specifically pharmaceutical companies have a role to play when it comes to ensuring that SSCM practices are implemented in their organizations. Top Management Commitment to attaining increased performance outcomes has been identified in extant literature as a major catalyst for the adoption and implementation of SSCM practices in a manufacturing organization (Plöckinger et al., 2016a; Ting et al. 2015a). Top management commitment is regarded as essential to management initiatives. Top management facilitates employee empowerment, improved levels of job, and adherence to industry standards. This study proposes that pharmaceutical sustainable supply chain management practices will lead to increased performance. Therefore, top management commitment is portrayed as a moderating variable, as illustrated in figure 3.1.



**Figure 3. 1 The proposed research framework**

Source: Author’s Construction (2023)

Top Management Commitment (TMC) within the context of sustainable supply chain refers to the active and visible support and leadership demonstrated by the senior executives and leaders of an organization towards sustainability initiatives within the supply chain. TMC involves the endorsement, allocation of resources, and integration of sustainability principles into the organization's strategic goals, decision-making processes, and day-to-day operations. It includes setting clear sustainability objectives, establishing policies, and promoting a culture of sustainability throughout the organization. TMC is crucial in driving the implementation of

sustainable practices, inspiring employee engagement, and ensuring the long-term success of sustainable supply chain efforts. Top managers have a significant impact on organizational results through the decisions they make, which are in turn influenced by the managers' personal qualities, according to the idea. The Upper Echelon Theory is often applied in the context of organizational and employee performance. Additionally, the cognitive and values domains of the top management becomes the central context of the upper echelon theory (Kim, 2021). Within the organizational context, performance is largely dependent on the values, expertise, and characteristics of top managers (Kim 2021; Díaz-Fernández et al., 2020). Managers contribute towards policy and strategy formation, direct daily operations, and implementing these policies and strategies so that targets could be attained. Institutional targets on their own cannot be actualized. Managers who are duly committed to the course thus lead the way and make it possible for those within the organization to follow due processes, build on cooperation where necessary, sources the necessary resources in the right manner so that performance outcomes could be increased (Kim, 2021; Rachmat Hidayat et al., 2020; Hambrick, 2018). With the forgoing understanding on upper echelon theory, this study adopts same and relies on the top-management as a moderator of the attainment of high-performance outcomes as sustainable supply chain practices are undertaken. Table 3. 1 presents the Constructs Definitions below:

**Table 3. 1 Constructs Definitions**

<b>Construct</b>	<b>Definition</b>
Operational Practices (OP)	Operational Practices (OP) in the context of sustainable supply chain management refer to efficient and eco-friendly procedures and activities within a company's operational framework that promote sustainability and reduce environmental impacts. These practices encompass processes such as waste reduction, energy efficiency, and green procurement (Bai et al. 2019; Truong et al. 2017).
Supply Chain Integration (SCI)	Supply Chain Integration (SCI) involves seamless collaboration and coordination among various entities within a supply chain, aiming to optimize processes and achieve mutual benefits. It is a strategic approach that can lead to competitive advantages by fostering tighter connections among suppliers, manufacturers, distributors, and customers (Tarigan, Siagian & Jie 2021; Turkulainen, Roh, Whipple & Swink 2017).
Environmental Management Practices (EMP)	Environmental Management Practices (EMPs) refer to a range of strategies, policies, and actions adopted by organizations to minimize their negative environmental impact and promote sustainable practices (Agyabeng-Mensah, Afum & Ahenkorah 2020; Wang, Li & Zhao 2018). These practices can include waste reduction, energy conservation, pollution control, recycling initiatives, sustainable sourcing, and adherence to environmental regulations (Muñoz-Torres, Fernández-Izquierdo, Rivera-Lirio, Ferrero-Ferrero & Escrig-Olmedo 2021; Agyabeng-Mensah et al. 2020).
Socially Inclusive Practices for Employees (SIPE)	Socially Inclusive Practices for Employees involve strategies and initiatives aimed at fostering a workplace environment that values diversity, inclusivity, and fairness for all employees, regardless of their backgrounds, abilities, gender, ethnicity, or other characteristics (Cox & Blake 1991).

<b>Construct</b>	<b>Definition</b>
Socially Inclusive Practices for the Community (SIPC)	Socially Inclusive Practices for the Community involve actions and initiatives by organizations to engage with and benefit the broader community in a fair and inclusive manner. This includes philanthropic activities, corporate social responsibility (CSR) programs, community development initiatives, and partnerships with local organizations or non-profits (Das 2018; Siegel & Vitaliano 2007).
Environmental performance (EPR)	Environmental performance refers to an organization's effectiveness in managing its impact on the environment through its operational activities, products, and services. It involves efforts to minimize negative environmental effects, promote sustainability, and comply with environmental regulations and standards (Agyabeng-Mensah et al. 2020; Yang et al. 2015).
Operations performance (OPR)	Operations performance refers to the efficiency and effectiveness of an organization's operations in producing goods and services. It encompasses various factors such as productivity, quality, speed, flexibility, and cost-effectiveness (Hani 2021; Prajogo, Mena & Chowdhury 2021).
Community-centered social performance (CSP)	Community-centered social performance in a business context refers to the actions and initiatives taken by an organization to positively impact the communities in which it operates. It involves engaging with and contributing to the well-being, development, and sustainability of the local communities (Das 2018).

Source: Author's Construction (2023)

### **3.5 Linking the theoretical foundation to the framework**

The study through the theoretical framework establishes that for the attainment of upstream sustainable supply chain management within the pharmaceutical industry, top executives must play a pivotal role. As the attainment of sustainability hangs on three major pillars (that is economic, social and environmental) within the operations of pharmaceutical companies, this can only be attained if top managers are committed to ensuring that not only is economic profitability attained, but managers should drive the pharmaceutical companies to contribute towards societal development and environmental protection. Thus, managers must leverage their expertise in strategic planning to guide operational decision making, shaping employees' performance and behavior (Kim, 2021; Díaz-Fernández et al., 2020; Hambrick, 2018). By so doing, the manifestation of upper echelon theory is felt within the operations of pharmaceutical industry and geared toward sustainable supply chain management. In light of the foregoing, this study conjectured that the proposed framework is in consonance with sustainable supply chain management and the upper echelon theory by making a strong case that the moderating role of top executives within the upstream pharmaceutical industry play a critical role in promoting performance.

### **3.6 Chapter Summary**

The chapter provided both empirical evidence and the development of hypotheses by taking into consideration the research objectives of the study. Primarily, the quantitative research objectives provided background for the development of hypotheses. Specific research ideas

were created to test theories about how top managers are committed, how certain sustainable practices in supply chains work, and how well they perform within the upstream pharmaceutical industry. Both theoretical arguments and empirical evidence from previous research were used to develop the hypotheses. The model of the study was then built based on the aforementioned relationships among the variables, allowing this current study to evaluate how sustainable practices in the pharmaceutical supply chain can boost performance. This model is at the core of this thesis, helping to find answers to quantitative research questions. In the next chapter, an explanation of the method adopted is provided. The process, data, tools and analysis methods are discussed. Important issues on ethical considerations are also discussed.

## **CHAPTER FOUR**

### **METHODOLOGY**

#### **4.1 Introduction**

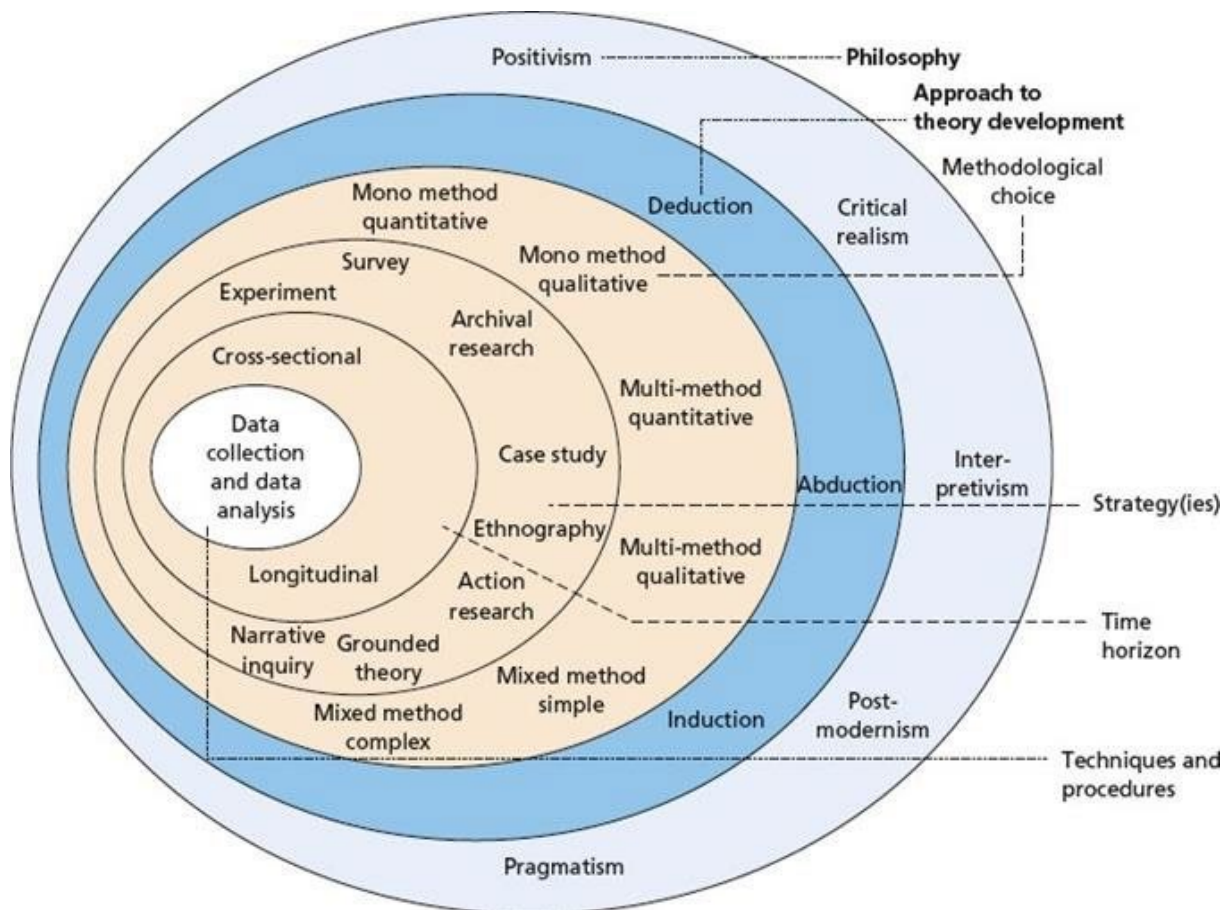
The previous chapter reviewed the relevant literature from which a theoretical framework for the study was developed. This chapter presents the methodological approaches used in examining the sustainable supply chain management practices within the upstream pharmaceutical industry in Ghana. For replicability, the chapter provides detailed information on all the sections in the chapter. The present chapter outlined the philosophical underpinnings of the research, research approach, research design, population, sampling method, and measurement instrument. Information about the research instruments used and how quantitative and qualitative data were collected and analyzed was also provided. Ethical considerations and data quality were also discussed. The chapter also covered how the researcher kept the study's validity and reliability intact and how the pilot test was carried out.

#### **4.2 Research Methodology**

Research methodology, as defined by Saunders, Lewis, and Thornhill, encompasses the systematic process and techniques employed by researchers to design, conduct, and analyze research studies (Saunders, 2019; Saunders et al., 2016). It involves the overall approach and strategy taken to address research questions, objectives, and achieve the study's goals. Within this framework, researchers make critical decisions concerning research design, data collection methods, data analysis techniques, and interpretation of findings (Saunders, 2019; Saunders, Lewis & Thornhill, 2015; Saunders et al., 2016). According to Saunders, Lewis, and Thornhill (2015), the essence of a research study can be summarized as follows. Firstly, research serves to advance knowledge within a specific field or discipline. It strives to generate new insights, theories, or practical implications that enhance understanding and address knowledge gaps, contributing to the academic community and intellectual progress. Secondly, research is characterized by systematic investigation. It follows a structured approach to explore a research problem or question, necessitating careful planning, data collection, analysis, and interpretation. The methodical nature of research ensures the validity, reliability, and credibility of findings. Thirdly, rigorous methodology is a hallmark of research studies. It involves the selection of appropriate research methods, data collection techniques, and analytical tools,

guided by established research principles and ethical guidelines. A rigorous methodology enhances the quality and integrity of the study's findings (Saunders, 2019; Saunders et al., 2015, 2016).

Furthermore, research is inherently problem-solving. It aims to address specific challenges or issues within a given context, offering solutions, recommendations, or insights that inform decision-making and practical applications (Saunders, 2019; Saunders et al., 2015, 2016). Research findings play a pivotal role in problem-solving, improving practices, and influencing policy development. Moreover, research contributes to both theory and practice. It aids in the development and refinement of theories and frameworks within a particular field, whether by building a theoretical foundation, validating existing theories, or proposing new perspectives. Additionally, research findings have practical implications that guide professionals and policymakers in making informed decisions and enhancing their practices (Saunders, 2019; Saunders et al., 2016). Lastly, research provides intellectual stimulation for researchers. It encourages critical thinking, problem-solving skills, and creativity. Engaging in research fosters a culture of inquiry and lifelong learning, as it prompts researchers to explore new ideas, challenge assumptions, and think critically about complex issues. In conclusion, the essence of a research study lies in its ability to contribute to knowledge, its systematic and rigorous methodology, problem-solving orientation, theoretical and practical implications, and the intellectual stimulation it offers. By embodying these elements, research endeavors aim to make meaningful and valuable contributions to academia, practice, and society at large (Saunders, 2019; Saunders et al., 2015, 2016). The "research onion" model, originally developed by Saunders, Lewis, and Thornhill (2007) visually represents the phases and stages that researchers navigate to effectively conduct research (Figure 4.1).



**Figure 4. 1 The Research Onion**

*Source:* Saunders, Thornhill, and Lewis (2007)

The Research Onion model presented by Saunders, Lewis, and Thornhill (2007) can be utilized as a coherent model of the current study to design methodological framework of the study. The model comprises layers sorted from broad philosophical foundations up to empirical data acquisition and processing. When it comes to this study, the Research Onion contributes to the methodology by highlighting a key issue of the methodological approach of systematical investigation and strict methodology. It maintains the research design is in line with the overall objectives and answers questions of the research in the best possible manner. This model's skin layers mainly focus on the philosophical underpinnings of the research guiding them in defining their ontological and epistemological assumptions. Thus, it serves as the model for the sequence and styles of research which was adopted. Inward, the research onion deals with tools for research, ways of data collection, and methods of data analysis, and these created a clear and coherent guide to the decision making of this current study. Another prominent component of the Research Onion is the iterative nature of all the research process, whereby researchers are

constantly coming back to reflect on and revise their methodology choices as well as analysis. By applying the principles set out within the model, this current study was able to guarantee, through honesty, the reliability and credibility of their findings.

In the view of Burrell and Morgan (1979), social science research methodology could be appreciated from the perspective of ontology, epistemology, human nature and regulation vs. change (Morgan 2012; Burrell 1979). In the view of Burrell and Morgan (1979) the nature of social science could be explained either from the objective or subjective view. This underlying assumption brings to mind the ontology, epistemology, and human nature (Burrell & Morgan 2019).

The nature of the world is captured by ontological philosophy. In the opinion of Burrell and Morgan (1979), the nature of things could be explained from two standpoints: realism and nominalism. Thus, in the view of realism, the social world of things has an independent nature and exist on its own. An observer's knowledge of the world or not does not impact the nature of things (Burrell & Morgan 2019). Contrary to realism, nominalism is what observers ascribe to reality around us. Thus, social world is what observers name it to be. Nominalism therefore relies on the sense-making of the observer (Burrell & Morgan 2019).

The validity of knowledge is captured by epistemology (Burrell & Morgan 2019). The process that an observer comes to know the world around us is the foundation of epistemology. The advanced argument under epistemology is that how can the knowledge be externalized and communicated. To this end, Burrell and Morgan (1979) postulated positivism and anti-positivism. Fundamentally, positivism maintains that knowledge is gained through an objectives and predefined rudimentary processes that is generally accepted. On the contrary, anti-positivism maintains that knowledge of the social world does not depend on predefined regulations and procedures (Burrell & Morgan 2019). According to anti-positivism, knowledge is therefore subjective in nature and does not follow an objective way for presentation.

Human nature in the view of Burrell and Morgan (1979) considers the relationship between humans and their environment. To this end, Burrell and Morgan (1979) maintained that people assume determinism or voluntarism stance when it comes to knowledge. Particularly, determinism opines that situations are often in control. For voluntarism, there is active engagement of the observer. Thus, people have a total free-will and are able to determine their destiny (Burrell & Morgan 2019).

### 4.3 Research Philosophy

In academic research, diverse perspectives arise from individual interpretations of reality based on knowledge and experiences. Scholars possess varying outlooks on reality and approach subjects or phenomena through different lenses. These perspectives are often encapsulated in researchers' worldviews, research philosophies, or paradigms, shaping the research they undertake (Saunders, 2019; Saunders et al., 2016). A research philosophy encompasses a set of beliefs, assumptions, and practices guiding the development of knowledge and influencing researchers' selection of research questions, methods, and analytical approaches (Muhaise, Ejiri, Muwanga, Zake & Kareyo, 2020; Saunders, 2019; Saunders et al., 2007). These philosophies (that is positivist, critical realism, interpretivism, post-modernism, and pragmatism) are distinctive in their principles and profoundly impact research projects. Hence, selecting an appropriate research philosophy is pivotal in research design and execution.

To determine a research paradigm, scholars must understand three fundamental assumptions grounding and differentiating these paradigms: ontology, epistemology, and axiology (Khatri, 2020; Saunders, 2019). Ontology involves researchers' assumptions about the nature of reality concerning the research phenomenon, guiding their perception and approach to the project (Yulianto, 2021; Goertz & Mahoney, 2012). Epistemology addresses what researchers claim to know and how they acquire knowledge, emphasizing what constitutes valid and acceptable knowledge and how researchers communicate their contributions (Yulianto, 2021; Goertz & Mahoney, 2012). Axiology, on the other hand, pertains to values and ethics in the research process, encompassing researchers' handling of their own values and those of the participants (Corry, Ulung Napitu, Wilson Simanjuntak & Bakhrul Khair Amal, 2021; Yulianto, 2021).

In essence, researchers navigate distinct paradigms based on these foundational perspectives, shaping the research process from ontology—defining reality—to epistemology—defining how knowledge is acquired—and axiology—incorporating values and ethics. These paradigms, with their respective philosophies and methodologies, offer researchers a framework to align their research design with their fundamental beliefs and intended outcomes (Corry et al., 2021; Yulianto, 2021).

For every research the idea is to investigate some fact, consolidate and or affirm some information on a given phenomenon within society or environment (Muhaise, Ejiri, Muwanga,

Zake & Kareyo, 2020; Dougherty, Slevc & Grand, 2019). Research facts must be accurate, measurable statistically, and able to be described in descriptive terms in order for a researcher to have effectively satisfied the aforementioned objectives (Berryman, 2019; Rashid, Rashid, Warraich, Sameen Sabir & Waseem, 2019) Research philosophy can be considered shared opinion and belief that a group of researchers have about a particular phenomenon, and forms the basis upon which information is collected, analyzed, interpreted, and understood (Khatri, 2020; Dougherty et al., 2019). Research philosophy is what a researcher recognizes as real and how information and knowledge can be acquired about such a phenomenon. The context of a study affects the methodologies and tactics that should be used to accomplish its aims. A research philosophy formulates presumptions that guide and support how a study is carried out (Muhaise et al., 2020; Dougherty et al., 2019). However, the selection of the research philosophy to be adopted is dependent on an understanding of the subject at hand (Khatri, 2020; Muhaise et al., 2020).

Understanding the adopted research philosophy can help in identifying and describing the presuppositions that are inherent in research and how appropriate these are for the methodology that has been selected (Khatri, 2020). The classification of research philosophies is ambiguous and difficult to understand, which has made conducting research more challenging.

#### **4.3.1 Positivist Research Philosophy**

According to the positivist research theory, it is possible to understand society objectively (Hammersley, 2019; Mkansi & Acheampong, 2012). According to this research philosophy, the scientist acts as an unbiased analyst, separating himself from personal ideals in order to work independently (Lee, 2020).

Positivism is a philosophy that holds that only information that is objective is that which was derived from observation (that is the senses), including reliable measurement (Lenzer, 2017). The researcher's responsibility in positivist investigations is restricted to the gathering and impartial analysis of data. In other words, the researcher approaches the study as an impartial analyst who dissociates herself from personal values. Research outcomes in these kinds of investigations are frequently observable and quantitative (Hammersley, 2019).

Quantifiable observations that result in statistical analysis are necessary for positivism (Hammersley, 2019; Mkansi & Acheampong, 2012). For many years, it has dominated the fields of business and management research. As a philosophy, positivism is said to be in line

with the empiricist theory that knowledge derives from human experience. The world is seen by it as consisting of discrete, observable elements and events that interact in a predictable, orderly, and atomistic way (Lee, 2020; Schmaus, 2020).

Additionally, there are no accommodations for human interests within positivist investigations, and the researcher is separate from the study (Hammersley, 2019). Positivist studies typically use a deductive approach in data analysis (Casula, Rangarajan & Shields, 2021). When conducting research, being independent means having little to no contact with your subjects. In other words, investigations using the positivist paradigm assume that the universe is external and objective and are based solely on facts (Hammersley, 2019).

#### **4.3.2 Interpretivist Research Philosophy**

According to the interpretivist research philosophy, social reality can be interpreted subjectively (Curry, 2020). The foundation of interpretivist research methodology is the idea that the researcher has a specific function in observing the social reality. This research philosophy states that research is driven by the researcher's interests (Curry, 2020; Poslajko, 2020).

Interpretivism seeks to explain the significance of social organizations, phenomenon, and life's events to human beings. Therefore, participants' perceptions of social reality as well as the researcher's beliefs, social values, culture, and goals all affect and influence interpretivism in research (Curry, 2020; Poslajko, 2020). Nothing can be measured or tallied in interpretivism; therefore, meanings of occurrences must be interpreted instead of cause-and-effect linkages being tested because social contexts and conditions are constantly changing (Curry, 2020; Poslajko, 2020).

#### **4.3.3 Pragmatism Research Philosophy**

Pragmatist recognizes notions as relevant only if they facilitate an action (McKenna & Hamington, 2021; Prasad, 2021). Pragmatists acknowledge that there are numerous perspectives in the world and how to do research, that no one perspective can ever provide the full picture, and that there may be multiple realities (Prasad, 2021; Clarke & Visser, 2019). Pragmatist researchers, who are often seasoned researchers, adapt the revised philosophical premises.

The most significant determining factor of the research philosophy, according to pragmatism, is the research question (Prasad, 2021; Clarke & Visser, 2019). According to the nature of the

research subject, pragmatists might combine both positivist and interpretivist viewpoints within the framework of a single study (Clarke & Visser, 2019; Kaushik & Walsh, 2019).

Pragmatist research philosophy allows for the integration of multiple research methodologies and research strategies within a single study, in contrast to positivism and interpretivism (Arseniev, 2019; Clarke & Visser, 2019; Low, 2019). Studies that adhere to the pragmatist research philosophy can also incorporate the use of many research techniques, including action research and qualitative, quantitative, and other research methods (McKenna & Hamington, 2021; Kaushik & Walsh, 2019).

Pragmatism characterizes research as a process where theories and concepts, depicting past actions, experiences, and interactions with the environment (Sekaran & Bougie, 2016). Rooted in actions, situations, and outcomes, the pragmatist paradigm prioritizes research problems over specific methods (Abutabenjeh & Jaradat, 2018). According to pragmatists, truth is transient and subject to change, directing their ontology, epistemology, and axiology toward enhancing practicality (Saunders, 2019; Saunders et al., 2016). Adherents of pragmatism contend that genuine knowledge is attainable by integrating various methods and strategies to address research problems (McKenna & Hamington, 2021; Prasad, 2021). They believe diverse perspectives, ideas, and theories enrich comprehension of the world (Sekaran & Bougie 2016). Consequently, pragmatists embrace a variety of research strategies, selecting them based on the specific characteristics of their research problems (Saunders, Lewis & Thornhill, 2019).

#### **4.3.4 Realism Philosophy**

Realism is a philosophical perspective and an approach to understanding the world that asserts the existence of an objective reality independent of our thoughts, feelings, and perceptions (Lamb, 2019; Roberts, 2014). It stands in contrast to various forms of idealism, which emphasize the primacy of mental or subjective constructs in shaping our understanding of the world. Realism posits that there is a single, external reality that exists independently of our perception of it. This reality is not contingent upon our beliefs, wishes, or interpretations (Rydenfelt, 2021; Roberts, 2014). Realists argue that the external world exists regardless of whether there are observers or knowers. In other words, reality is not dependent on human consciousness (Glick, 2021; Rydenfelt, 2021; Roberts, 2014). In the philosophy of science, scientific realism is a form of worldview that holds that scientific theories and models aim to provide accurate descriptions of the objective reality. While these models may evolve and

change over time, they are considered to be approximations of the underlying truth about the world.

#### **4.3.5 Philosophical stance of this thesis**

In the field of research, understanding different philosophical positions is crucial as it provides researchers and practitioners with the ability to argue for various research approaches and choose their one area of focus (Laszlo, 2021; Muhaise et al., 2020). This awareness of different philosophical positions is evident in this thesis, allowing for the confident selection of the appropriate research philosophy for the study. In this case, the chosen research philosophy aligns with pragmatism which prioritizes the practical implications of research findings and recognizes the existence of multiple realities (Sekaran & Bougie, 2016). Pragmatism facilitated the integration of both quantitative and qualitative methods, aligning with the belief that comprehensive understanding requires embracing diverse perspectives (Abutabenjeh & Jaradat, 2018). The quantitative aspect involved collecting observable data and testing hypotheses, reflecting objectivity akin to natural sciences. This approach enabled establishing cause-effect relationships between SSCM practices and organizational performance through statistical analysis. Furthermore, pragmatism allowed for contextualizing the study within a specific industry, enabling a nuanced exploration of intricate constructs like Operational Practices (OP), Supply Chain Integration (SCI), and Environmental Management Practices (EMP) (Saunders et al., 2019). It acknowledged that these constructs are shaped by both objective factors, such as performance outcomes, and subjective practices, such as SSCM practices. Pragmatism's flexibility enabled balancing subjective insights with objectivity, enhancing the study's pertinence to the particular industry and organizational context (Saunders et al., 2019). Moreover, the pragmatist paradigm's recognition of uncertainties in the business environment proved advantageous (Abutabenjeh & Jaradat, 2018). It allowed for adaptable research methods based on emerging needs, yielding practical insights to address SSCM practices and performance challenges within the dynamic business landscape specific to the research context.

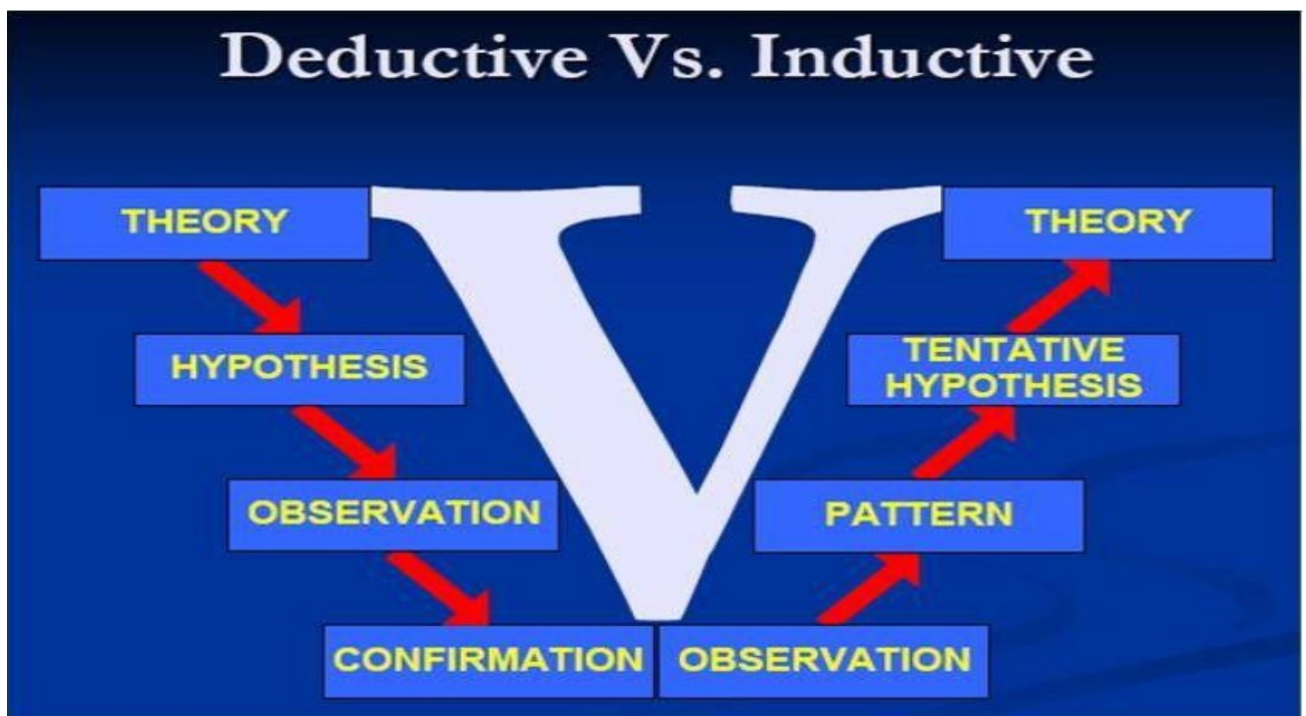
However, integrating both quantitative and qualitative research in a single study required meticulous resource allocation, emphasizing breadth over depth in data collection and analysis (Abutabenjeh & Jaradat, 2018). Additionally, the context-specific nature of pragmatist studies might limit generalizability to other organizational contexts, such as financial or educational

institutions. Nonetheless, these limitations were counterbalanced by the study's focus on practical and contextually relevant solutions (Shannon-Baker, 2016). By adopting a pragmatist paradigm, the research model can be developed and linked to relevant theories, which is crucial for theory testing and aligns with the research's core objectives.

#### 4.4 Research Approach

It is possible to think of a research approach as a detailed procedural plan that outlines the procedures the researcher used to carry out the study. Therefore, the decision to conduct particular research is dependent on the issue that has to be solved. Approaches to research can range from broad hypotheses to specific techniques for gathering, analyzing, and interpreting data. This plan involves multiple decisions and research plans.

This choice should be based on the researcher's philosophical presuppositions, the specific data collecting, analysis, and interpretation techniques used in the study. The kind of research topic or issue being addressed, the researchers' individual experiences, and the study's target audiences are all taken into consideration when choosing a research approach. Burney and Saleem (2008) outlined the fundamental characteristics of deductive and inductive approaches, as depicted in Figure 4.2.



**Figure 4. 2 Deductive and Inductive Approaches**

Source: (Burney & Saleem 2008)

#### **4.4.1 Deductive Approach**

The deductive approach develops hypotheses based on current theory before designing research plans to test those hypotheses (Young, Varpio, Uijtdehaage & Paradis, 2020; Streefkerk, 2019). It has been advanced that in the absence of theory, it is practically impossible to rely on the deductive approach for a study (Streefkerk, 2019; Azungah, 2018). As a result, deductive research can only be carried out after inductive investigation. Some academics believe that the deductive method is particularly well suited to positivism (Casula et al., 2021; Young et al., 2020; Azungah, 2018), which allows for the formulation of hypotheses with anticipated outcomes that can be statistically tested.

A deductive approach is consequently better suitable for the positivist researcher who needs to develop and test hypotheses. In a few rare instances, a qualitative researcher may also use a deductive technique, however they would not be able to formulate and test hypotheses to test expectations from pre-existing theory, therefore testing would then be carried out differently (Young et al. 2020).

#### **4.4.2 Inductive Approach**

Researchers use an inductive technique when there is no prior theory or literature on the topic of their study because there will be no theory to test (Young et al., 2020; Streefkerk, 2019). Therefore, it is believed that the inductive technique might lead to the creation of new theories. However, after reviewing the data, a researcher can occasionally find that the study fits with and is supported by an existing hypothesis (Streefkerk, 2019; Burney & Saleem, 2008).

The inductive approach is more common in qualitative research because there is no pre-existing theory to predetermine the process of the study, which reduces the possible researcher's bias. When employing the qualitative method, researchers interview participants before examining the data to look for trends among participants. Therefore, the steps of the inductive process are observation, pattern, tentative hypothesis, and theory (Bell, 2022).

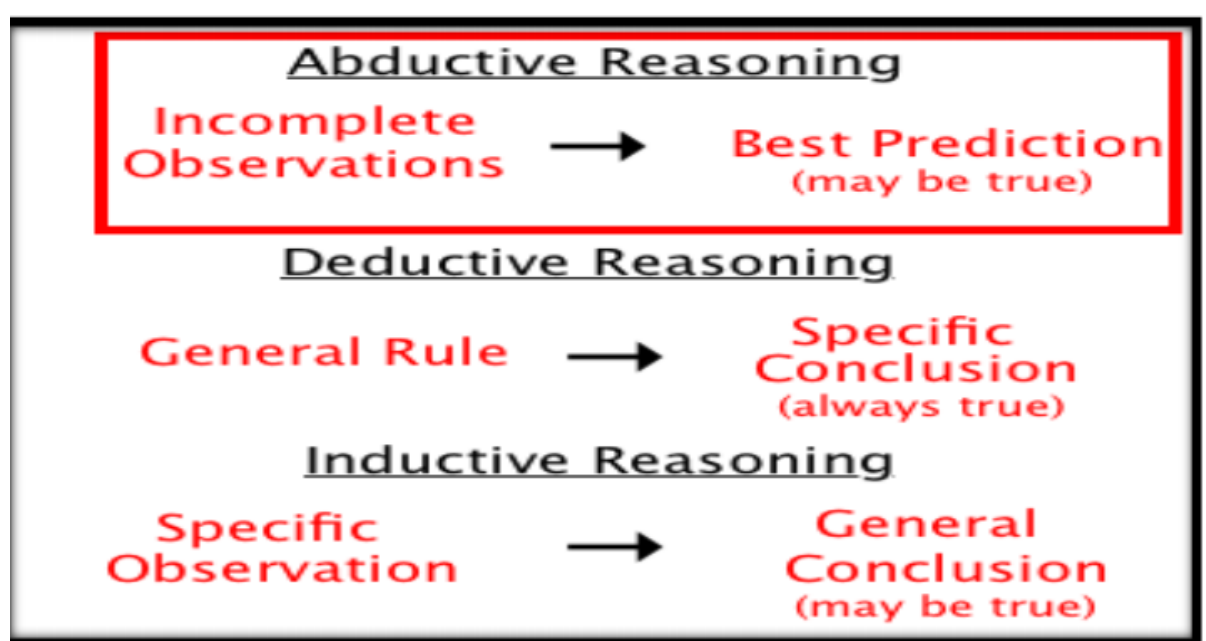
#### **4.4.3 Abductive Research Approach**

The abductive research approach, also known as abduction or abductive reasoning, is a form of reasoning or inference that combines elements of inductive and deductive reasoning. It was first introduced by the philosopher and logician Charles Sanders Peirce and has gained prominence in qualitative research methodologies (Awuzie & McDermott, 2017; Dubois & Gadde, 2002).

In the abductive approach, researchers use observations, data, and existing theories or concepts to develop plausible explanations or hypotheses for a given phenomenon. It involves moving back and forth between data and theory to generate new insights and explanations. Abductive reasoning seeks to bridge the gap between observed phenomena and the theoretical frameworks that can explain them (Awuzie & McDermott, 2017; Wiles, Crow & Pain, 2011).

The abductive research approach is commonly used in qualitative research, particularly in fields such as social sciences, interpretive research, and grounded theory. It is valuable for exploring new areas of inquiry, generating theories or conceptual frameworks, and making sense of complex or ambiguous phenomena. By employing abductive reasoning, researchers can uncover hidden patterns, discover novel explanations, and generate new knowledge. It allows researchers to go beyond existing theories and frameworks and explore alternative perspectives, fostering creativity and innovation in the research process.

An abductive technique employs readily accessible information which is often partial information to aid provision of the best explanation and conclusion for a phenomenon. This is the fundamental reason why "abductive" is typically referred to as "abductive reasoning," rather than a strategy (Earl Rinehart, 2021; Awuzie & McDermott, 2017). The three main strategies have been addressed, and the differences between them are illustrated in Figure 4.3.



**Figure 4. 3 Deductive, inductive and abductive approaches.**

Source: (Bryman & Bell 2015)

#### **4.4.4 Choice of research approach**

The current study relied on the abductive research approach to examine the research objectives. The choice of the abductive research approach lies in its ability to combine both deductive and inductive reasoning in coming out with the findings of the study. Again, since the study both test hypotheses and at the same time provide subjective interpretation of the results from both qualitative and quantitative stance, abductive approach was appropriate. The explanations of the three approaches illustrate that the deductive method is typically aligned with the positivist scientific concept, while the inductive approach corresponds with the interpretivism viewpoint. The abductive approach blends elements of both deductive and inductive methodologies. However, for this study, an abductive approach was chosen, encompassing the collection of qualitative and quantitative data on various phenomena at different time points. The rationale for selecting an abductive research methodology in this mixed-methods exploration of SSCM in Ghana's pharmaceutical sector stems from the intricate nature of the research phenomena. SSCM involves intricate interconnections among social, economic, and environmental elements, making it well-suited for an abductive methodology that supports thorough investigation. The abduction process enables the amalgamation of qualitative and quantitative facts, fostering a comprehensive understanding of the subject matter. Moreover, it aids in the advancement of theoretical frameworks, particularly crucial when examining SSCM within a specific context, like Ghana's pharmaceutical industry. Additionally, the adaptability of abductive reasoning accommodates evolving research inquiries and considers the inherent contextual complexities associated with the investigation. Overall, abductive reasoning aligns with the complex and ever-evolving nature of SSCM in Ghana's pharmaceutical sector, justifying its selection as a methodology.

The research methodology employed in this study is underpinned by a blend of epistemological, ontological, and axiological perspectives, forming the foundation for addressing the intricate research question concerning sustainable supply chain management practices within Ghana's pharmaceutical industry. These philosophical foundations significantly shape the research strategy and methods, as emphasized by Saunders et al. (2019). Specifically, this study adopts an abductive research approach, amalgamating both inductive and deductive approaches to research (Hurley, Dietrich & Rundle-Thiele, 2021). This approach involves developing a conceptual model based on qualitative data, allowing for an in-depth exploration of the multifaceted phenomenon of sustainable supply chain management. Being a qualitative

method, abductive research facilitates the identification of themes and patterns, informing theory development or refinement. This aligns with the dynamic and context-specific nature of sustainable supply chain practices in the pharmaceutical industry (Carter & Rogers, 2008). Moreover, the abductive approach permits an iterative process of data collection, analysis, and theory development, recognizing the evolving nature of sustainable supply chain practices (Hurley et al., 2021; Awuzie & McDermott, 2017). Given the distinctive contextual factors influencing supply chain practices in Ghana, particularly in an emerging economy, this methodology allows sensitivity to the local context and the generation of contextually relevant insights. Additionally, it aligns with the practical implications of the research, as sustainable supply chain management holds significant real-world implications for businesses and policymakers (Sánchez-Flores et al., 2020b). The abductive research approach, rooted in qualitative data collection, offers a comprehensive understanding of the research phenomenon. Qualitative data, known for its richness and depth, is particularly apt for exploring complex topics like sustainable supply chain management (Ruggiano & Perry, 2019; Castleberry & Nolen, 2018). By adopting this approach, the study endeavors not only to describe the current state of sustainable supply chain practices but also to contribute to theory development and provide practical recommendations for enhancing supply chain sustainability in Ghana's pharmaceutical industry (Scavarda, Daú, Scavarda & Korzenowski, 2019; Castleberry & Nolen, 2018). Thus, this methodology is well-suited to address the research objectives and offer valuable insights into sustainable supply chain management practices in the Ghanaian pharmaceutical sector.

Furthermore, the use of the abductive methodology facilitates a cyclical progression involving empirical evidence gathering, thorough analysis, and theoretical framework formulation, thus recognizing the dynamic characteristics inherent in sustainable supply chain practices (Earl Rinehart, 2021; Awuzie & McDermott, 2017). The objective of this study is to examine the current status of sustainable supply chain practices and make contributions to theoretical advancement. Additionally, this research aims to provide practical suggestions for improving supply chain sustainability within the pharmaceutical industry in Ghana. This approach is influenced by the works of (Eisenhardt & Graebner, 2007), (De Brito & Van der Laan, 2010), and Earl Rinehart (2021). Therefore, this approach is very appropriate for addressing the research objectives and offering significant insights on sustainable supply chain management practices within the pharmaceutical industry in Ghana.

## **4.5 Research Design**

A crucial component of performing scientific research is designing the study. The research design, which is influenced by the researcher's philosophy, outlines the broad strategy a researcher uses to respond to research questions (Saunders, Lewis & Thornhill, 2019). Methods such as mixed, quantitative, and qualitative research are among the general techniques to designing research (Dawadi, Shrestha & Giri, 2021; Creswell & Creswell, 2018b; Flick, 2018). Research design refers to the overall strategy or grand plan that a researcher chooses to integrate the different components of the study in a coherent and logical way, it thereby, help to effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data (Delhi & Kumar Nayak Priyanka Singh, 2021; Tobi & Kampen, 2018). The two most common types of research designs are quantitative and qualitative (Jilcha Sileyew, 2020; Tobi & Kampen, 2018). However, there are three different types of research designs identified in extant literature: quantitative, qualitative, and mixed. (Creswell & Creswell, 2018a; Flick, 2018; Chu & Chang, 2017).

### **4.5.1 Quantitative Research Design**

Quantitative research, as described by Creswell and Creswell (2018), involves the collection of concrete, measurable facts that are subsequently subjected to statistical analysis. This analytical approach enables researchers to uncover correlations between the variables they are studying, shedding light on the relationships within the raw quantitative data (Creswell & Creswell, 2018b). Punch (2005) further delineates the process of quantitative research, highlighting its logical sequence: from formulating hypotheses, gathering and statistically analyzing data, to testing these hypotheses and making decisions regarding their acceptance or rejection. This type of research can take on either a descriptive or experimental nature, with the latter exploring the causative factors behind observed associations (Punch, 2005). In this context, Creswell and Creswell (2018b) identified key characteristics of quantitative research, emphasizing structured data collection, typically involving a large sample size to ensure representativeness. The methodology is carefully planned before data collection begins, with a clear research question serving as a guiding compass. Quantitative research is known for its presentation of data through graphical means like charts and tables, facilitating comprehension (Creswell & Creswell, 2018b; Chu & Chang, 2017). Additionally, its statistical analysis allows for the exploration of associations and cause-effect relationships, enabling the generalization of results to similar populations.

#### **4.5.2 Qualitative Research Design**

According to Hair et al. (2019), qualitative data is sourced by noting words, phrases, and occasionally textual or visual descriptions to offer in-depth information on a phenomenon rather than utilizing numbers allocated to gathered data. Comparatively speaking to quantitative research, qualitative research often ends with the creation of conceptual models and hypotheses. Additionally, the literature review helps to generate open-ended questions that are used in a qualitative study's data gathering (Hair, Page & Brunsveld, 2019).

Denzin and Lincoln (2005) define qualitative research as a means to collecting and analyzing non-numerical data that aims to explore, expose, and understand the meanings, symbols, behaviour, and perceptions of people in their social lives (Denzin, Lincoln, Yvonna, 2005). In the view of Roberts (2014), qualitative approach aims to identify the observer in the world and as a result necessitates that the researcher refrains from imposing his or her own point of view in order to allow respondents to form their own opinions regarding the research phenomena (Roberts 2014). The approach appears to be structured more by the target population (respondents) than by the researcher, as qualitative research encourages the researcher to study the meanings and interpretations of respondents' own everyday lives (Bryman & Bell, 2015). Open-ended in-depth interviews are the most effective method for obtaining the accurate respondents' interpretation (Natow, 2020; Chu & Chang, 2017). This enables the researcher to refine the questions as the process progresses, allowing the respondent to add to the knowledge. Typically, qualitative research is only used by researchers when they need to explore the significance of an observation rather than looking for causal relationships between study variables (Earl Rinehart, 2021; Selvi, 2019). Non-probability is the typical sampling approach used in qualitative research, mostly because the researcher chooses a sample based on the characteristics of the target population (Zhang, 2019; Ganesh, Pineau & Chakraborty, 2017).

#### **4.5.3 Mixed Method Research Design**

Mixed methods research design is a comprehensive approach that combines qualitative and quantitative research methods to gain a more complete understanding of a research problem or question (Creswell & Creswell, 2018b; Chu & Chang, 2017). It involves collecting, analyzing, and integrating both qualitative and quantitative data to provide a more comprehensive and nuanced perspective.

The main purpose of using a mixed methods research design is to capitalize on the strengths of both qualitative and quantitative methods while mitigating their limitations (Flick, 2018;

Torrance, 2012). Qualitative methods, such as interviews or observations, provide in-depth insights and rich descriptions of participants' experiences, perceptions, and contexts. On the other hand, quantitative methods, such as surveys or experiments, allow for the collection of numerical data that can be analyzed statistically to identify patterns and relationships.

Researchers who conduct mixed-method studies collect quantitative and qualitative data sequentially or concurrently to understand the research problem better. Creswell, Plano Clark, Gutmann, and Hanson (2003) indicated that researchers must consider priority, implementation, and integration when designing mixed-method research. As a priority, researchers must decide whether they will focus more on quantitative or qualitative design (Creswell, Plano Clark, Vicki, Gutmann & Hanson, 2003). Implementation requires the researcher to decide whether the collection and analysis of the numeric and non-numeric data will be done sequentially or concurrently. Finally, integration refers to “the extent that different data elements and/or varied strategies for analysis of those elements are combined in such a way as to become interdependent in reaching a common theoretical or research goal” (Bazeley, 2016). Thus, the researcher must decide the stage at which the quantitative and qualitative data connect within the research process (Bazeley, 2016).

The integration of qualitative and quantitative approaches in a mixed methods design offers several advantages. First, it allows researchers to triangulate the findings by corroborating or contrasting the results obtained from different methods. This enhances the validity and reliability of the research findings (Creswell & Creswell, 2018b; Torrance, 2012). Second, it provides a more comprehensive understanding of complex research questions, as qualitative data can help explain the meaning and context behind quantitative results. Third, it enables researchers to explore unexpected or unanticipated phenomena that may emerge during data collection, thus allowing for a more exploratory and flexible research process.

The process of conducting mixed methods research involves several key steps. These include designing the research study, collecting data through qualitative and quantitative methods, analyzing the data separately, integrating the findings, and interpreting the results in a coherent and meaningful way. Integration can be achieved through data merging, connecting or comparing findings, or developing a unified narrative that incorporates both qualitative and quantitative evidence.

Mixed methods research design is particularly valuable in fields where complex social phenomena require multiple perspectives and approaches. It is commonly used in disciplines such as education, psychology, sociology, healthcare, and organizational studies. By combining qualitative and quantitative methods, researchers can address research questions more comprehensively, generate deeper insights, and produce robust evidence for decision-making and policy formulation.

In conclusion, mixed methods research design offers a powerful and flexible approach to investigating complex research questions. By combining qualitative and quantitative methods, researchers can gain a more comprehensive understanding of phenomena, triangulate findings, and explore unexpected insights. The integration of different data types and analysis approaches enhances the validity, reliability, and depth of research findings, making mixed methods research design a valuable tool in advancing knowledge across various disciplines.

Researchers conducting mixed-method studies gather quantitative and qualitative data either sequentially or concurrently, aiming to enhance their understanding of the research problem (Creswell, Plano Clark, Gutmann, & Hanson, 2003).

Creswell and Plano Clark (2011) outlined six dimensions of mixed-method design: exploratory sequential design, transformative design, convergent parallel design, explanatory sequential design, embedded design, and multiphase design. In convergent parallel design, both qualitative and quantitative data on the same phenomenon are collected separately and then merged for interpretation. Embedded design involves one method playing a secondary supporting role to enhance the study's understanding. Exploratory design begins with collecting and analyzing qualitative data, followed by the collection and analysis of quantitative data. Conversely, explanatory sequential design starts with collecting quantitative data and is followed by qualitative data collection to explain the quantitative outcomes. Transformative design is shaped by a transformative theoretical model, influencing the interaction, priority, timing, and mixing of qualitative and quantitative designs. Finally, multiphase design involves using more than two phases or combining both sequential and concurrent strands over time to address an overall program objective (Cresswell & Plano Clark, 2011).

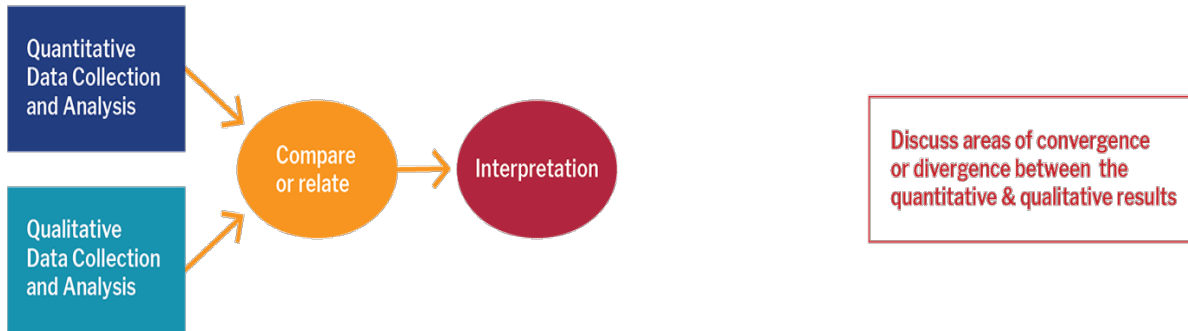
Different mixed method types exist. They are distinguished by the manner and timing of the qualitative and quantitative research components. Notable types of mixed methods include sequential explanatory mixed methods, sequential exploratory mixed methods,

concurrent/parallel mixed methods, and nested mixed methods (Ngulube, 2021; Schoonenboom & Johnson, 2017). A technique called sequential exploratory design involves conducting qualitative research first and quantitative study later. This method allows a researcher to thoroughly research a subject before adding numerical data to it. This approach may be used to examine the components of a theory derived from qualitative research and to extrapolate qualitative results from one population sample to another (Schoonenboom & Johnson 2017).

When qualitative research is conducted after quantitative research, this is known as a sequential explanatory design (Ngulube, 2021; Schoonenboom & Johnson, 2017). Here, quantitative data is given precedence. To assist the researcher in interpreting the quantitative data, qualitative data is collected later. When the researcher wishes to engage in a thorough explanation, interpretation, and contextualization of quantitative data, the sequential explanatory design is employed (Dawadi et al., 2021). The simultaneous collecting of qualitative and quantitative data is known as concurrent triangulation design (Dawadi et al., 2021; Ngulube, 2021). Both approaches are given equal weight in this case, and both forms of data are analyzed both independently and concurrently. When the researcher wants to learn everything there is to know about a subject and cross-validate results, the concurrent triangulation design is used (Ngulube 2021). Given the nature of this dissertation, the concurrent/parallel mixed method was used. Figure 4.4 presents the basic Mixed Methods Research Designs.

## BASIC MIXED METHODS RESEARCH DESIGNS

### Convergent Parallel Design



### Explanatory Sequential Design



### Exploratory Sequential Design



**Figure 4. 4 Basic Mixed Methods Research Designs.**

Source: Harvard Catalyst (2023)

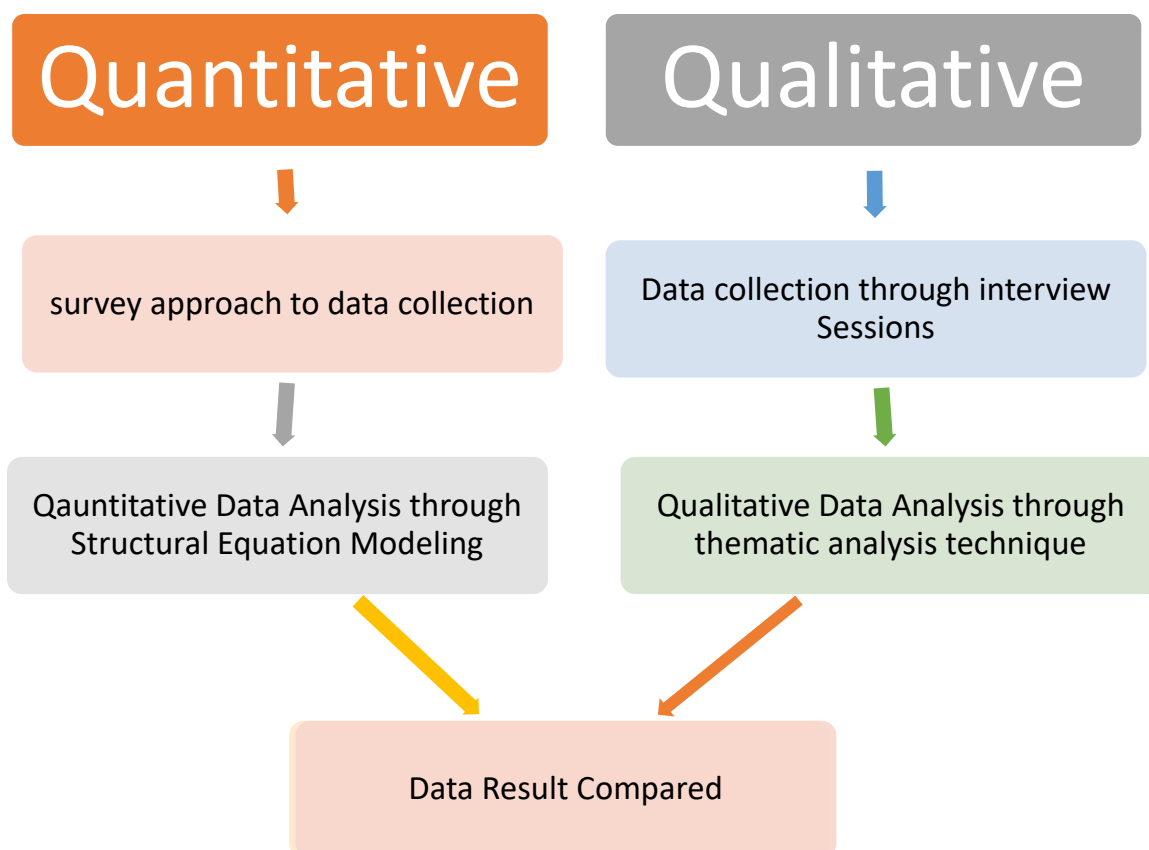
#### 4.5.4 Choice of research design

This study adopted a concurrent/parallel mixed methods design, seamlessly integrating both quantitative and qualitative data to explore upstream pharmaceutical SSCM practices and their impact on the performance of companies in Ghana (McCrudden & McTigue, 2019). The mixed research designs aimed to understand the evolution of these practices and their influence on organizational performance over time (Creswell & Creswell, 2018b; Flick, 2018; Chu & Chang, 2017). Quantitative data was initially collected through a structured questionnaire survey, focusing on predictive relationships between exogenous variables in the research model, organizational performance, and top management commitment (McCrudden and McTigue, 2019). Subsequently, qualitative data was sourced through in-depth interviews,

enriching the quantitative outcomes by understanding the underlying reasons for the predictive constructs influencing SSCM practices.

In this concurrent/parallel mixed-method approach, both qualitative and quantitative data were collected simultaneously, with integration occurring at various stages, from designing the interview guide based on quantitative results to selecting interviewees and discussing research outcomes (Creswell & Creswell, 2017). The integration helped in merging the insights obtained from both methods, providing a comprehensive understanding of the complex relationship between top management commitment, SSCM practices, and performance outcomes.

The necessity for this concurrent parallel approach stemmed from the insufficiency of either quantitative or qualitative methodologies alone to fully grasp the predictive role of top management commitment in enhancing SSCM practices and their effects on performance outcomes (Ivankova, Creswell & Stick, 2006). Quantitative data offered significant information on research questions and hypotheses, while qualitative data delved into the causes underlying the statistical outcomes, justifying the findings derived from the statistical analysis (McCrudden and McTigue, 2019). Figure 4.5, representing the mixed method design procedure, as suggested by Creswell et al. (2018), summarily outlines the approach taken in this study.



**Figure 4. 5 Mixed research approach**

Source: (Creswell & Creswell 2018b)

#### 4.6 Research Strategy

The research strategy outlines the researcher's plans for completing the task (Saunders et al., 2007). According to Saunders et al. (2007), research strategy refers to the overall plan or framework that guides the researcher's approach to conducting a study. It provides a systematic and structured framework for addressing the research objectives and answering the research questions (Saunders et al., 2007). Saunders et al. (2007), along with other authors, categorizes research strategies into four main types: experimental, survey, case study, and action research.

In undertaking research, a researcher must carefully select a research strategy, described by Saunders et al. (2019) as the comprehensive plan devised to address the research questions of a specific project. The strategy chosen guides the researcher in achieving consistency and coherence throughout the research design, aligning with the purpose of gaining a broad understanding or a deep comprehension of the study concepts (Saunders et al., 2019).

Various research strategies, as outlined in the existing literature on research methods, offer diverse approaches to study design. These include experiments, surveys, case studies, grounded theory, ethnography, action research, narrative inquiry, and archival research (Saunders et al. 2019). Each strategy is tailored to specific research objectives, aiding the researcher in selecting an approach aligned with the nature and goals of their study.

#### **4.6.1 Experimental Research Strategy**

Experimental research involves manipulating one or more variables to observe the effects and determine cause-and-effect relationships. It typically includes the use of control groups, random assignment, and rigorous data analysis. Experimental research aims to establish causal relationships and is often conducted in controlled laboratory settings (Miller, Smith & Pugatch, 2020). Conducting a study utilizing an experimental research strategy entails two fundamental features: manipulation and control, as described by Singleton and Straits (2012). In experimental research, the researcher intentionally manipulates one or more variables to observe their effects and discern cause-and-effect relationships. This approach typically involves the utilization of control groups, random assignment, and rigorous data analysis, often occurring within controlled laboratory settings (Singleton & Straits, 2012).

The primary objective of experimental research is to establish causal relationships by examining how a change in an independent variable, such as SSCM practices, influences alterations in the dependent or endogenous variables, like performance outcomes (Saunders et al. 2019). Through deliberate manipulation and systematic analysis, researchers aim to discern the probability of a specific alteration in the independent variable causing a corresponding change in the dependent variable, contributing to a deeper understanding of causality within the study context.

#### **4.6.2 Survey Research Strategy**

The survey research strategy involves collecting data from a large sample of participants using structured questionnaires or interviews. Surveys are used to gather information on people's attitudes, opinions, behaviors, and characteristics (Saunders et al., 2015, 2016). The data collected are analyzed statistically to identify patterns and trends. Survey research allows for generalization to a larger population and is commonly used in social sciences, marketing, and public opinion research (Saunders, 2019; Saunders et al., 2016). In order to gather information from a group of individuals on a specific topic during a survey, the researcher must follow a standard or standardized approach. In order to understand what a certain group of individuals

do or think as a whole, a survey simply entails identifying that group and gathering information from some of its members (Leeuw, Hox & Dillman, 2012).

#### **4.6.3 Case Study Research Strategy**

The case study research strategy focuses on in-depth exploration and analysis of a specific case or multiple cases within a bounded context (Rule & John, 2015; Crowe et al., 2011). It involves collecting and analyzing qualitative data, such as interviews, observations, and documents, to understand the complexities and unique aspects of the case(s). Case study research is often used when the research questions require an in-depth understanding of a particular phenomenon or when little is known about the topic (Ridder, 2017; Crowe et al., 2011). The subject of a case study is the person, group, company, occasion, or circumstance that the researcher is most interested in (Sekaran and Bougie, 2015). Leveraging numerous sources of information, the researcher uses a case study research technique to examine a particular current occurrence in its actual setting (Saunders et al., 2019). For analysis and interpretation, case studies can include both qualitative and quantitative data. The researcher hopes to create a theory by using the grounded theory research approach. A researcher could, for instance, aim to create a hypothesis to explain why a specific SSCM practice improves performance. A researcher may choose to use an ethnographic approach, which calls for conducting the inquiry in the real-world settings of the target respondents and entailing interaction, participation, or observation of the respondents' everyday activities. Group studies are investigated by ethnographers (Saunders et al., 2019).

#### **4.6.4 Action Research Strategy**

Action research is a collaborative and participatory approach to research, where researchers work closely with practitioners to identify and address practical problems or challenges (Shani & Coghlan, 2021). It involves cycles of problem identification, data collection, analysis, and implementation of interventions to bring about positive change. Action research aims to generate practical knowledge that can be used to improve practices and processes in real-world settings.

Each research strategy has its strengths and weaknesses, and the choice of strategy depends on the research objectives, research questions, and the nature of the phenomenon being investigated. It is important for researchers to carefully select and align their research strategy with their research aims to ensure that the chosen strategy effectively addresses the research objectives and provides relevant and meaningful insights. The plan may incorporate a variety

of methods, including experimental research, action research, case study research, interviews, surveys, or a thorough assessment of the literature.

Action research involves studies done to address organizational problems in a specific way. The researcher starts with a problem that has already been recognized and collects pertinent information in order to bring about intended modifications and a solution to the issue (Sekaran and Bougie, 2015).

#### **4.6.5 Research Strategy Adopted.**

Drawing from the research methodologies discussed earlier, this study embraced the survey research strategy, aligning with the insights of Saunders et al. (2019). Within this strategy, the researcher diligently gathered substantial empirical or primary data from a diverse sample of respondents randomly selected from the Pharmaceutical Manufacturing Association of Ghana (PMAG). The survey approach facilitated the use of structured questionnaires and structured interviews, following a predetermined procedure, thus integrating seamlessly into the mixed method design.

The survey strategy was instrumental in enabling the researcher to amass comprehensive insights by exploring the relationships among the constructs within the research model. This, in turn, allowed for the generalization of research outcomes to the pharmaceutical manufacturing industry in Ghana. Consequently, the responses and findings obtained from both the structured questionnaires and interviews were juxtaposed to effectively achieve the research objectives outlined in Chapter 1 of the study.

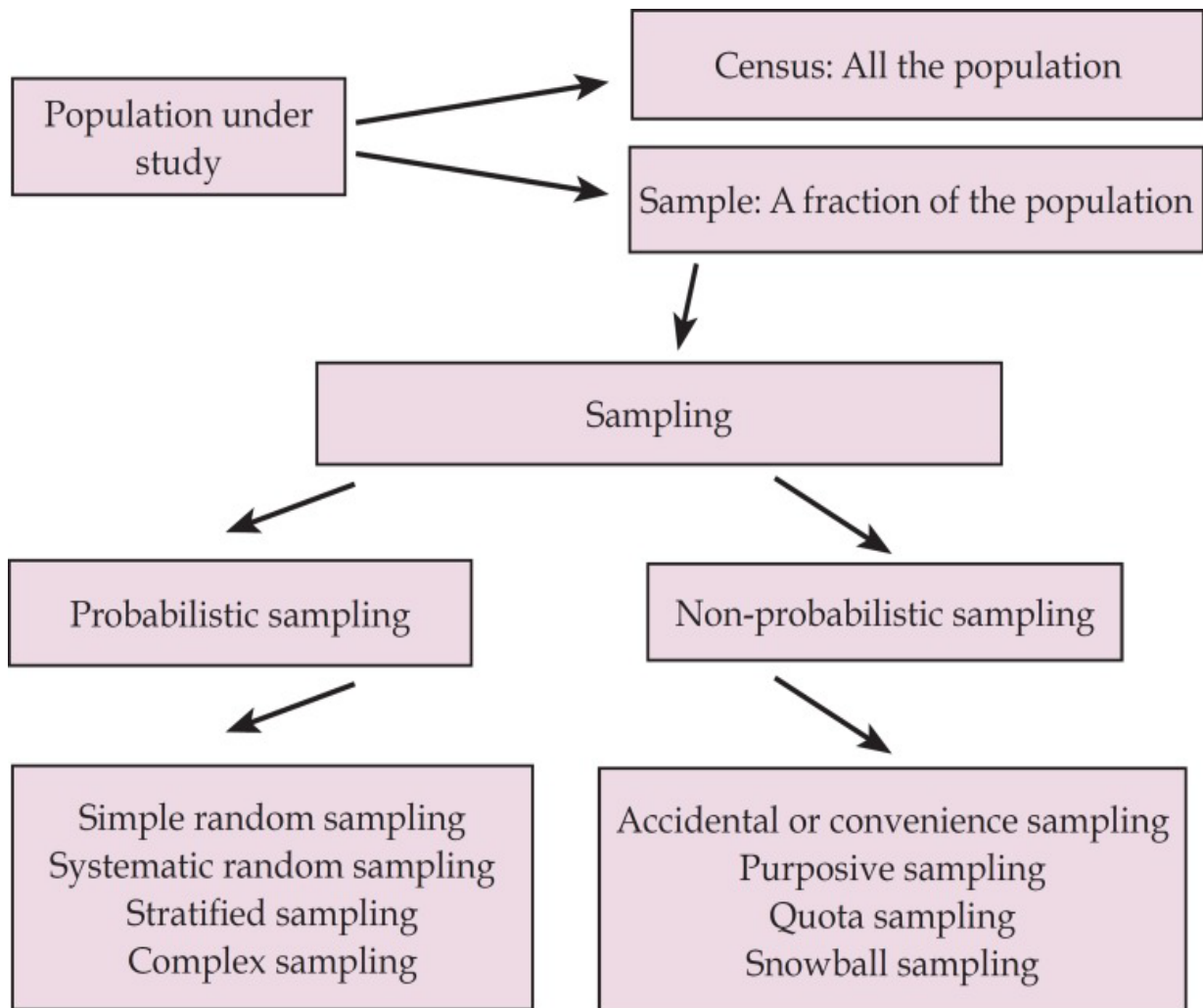
#### **4.6 The Sampling Process**

Sampling serves as a critical component in data collection, allowing for the drawing of meaningful conclusions about a specified target population. The sampling process comprises several vital steps, including delineating the target population, identifying the sampling frame, selecting an appropriate sampling method, establishing the required sample size, and executing the devised sampling plan (Hair et al., 2019; Taherdoost, 2018a; Sekaran & Bougie, 2016).

#### **4.7 Population**

Population for any study contains the characteristics around which studies are carried out. A population is often very large and thus provides grounds for sampling some units for a research study (Casteel & Bridier, 2021; Davis, 2020; Sparks & Joyner, 2019). A research population is the entire set of cases from which a research sample is drawn for investigation (Hair et al.,

2019; Taherdoost, 2018a; Sekaran & Bougie, 2016). The population for this study comprised employees of 38 firms registered with the Pharmaceutical Manufacturers Association of Ghana (PMAG). Pharmaceutical companies wholly owned by Ghanaians and located in the Greater Accra Region of Ghana constituted the target population. These firms have an estimated 2000 employees. Every population is made up of two distinct groups, that is, the target population and the accessible population. While the target population represents the section of the population from which certain desired characteristics are found, the accessible population represents a unit of the target population that the researcher can find and use with a fair degree of stress and effort. Figure 4.6 illustrate population, target population and sample in the research.



**Figure 4. 6 Population, target population and sample in research.**

Source: Martínez-Mesa, González-Chica, Duquia, Bonamigo & Bastos (2016)

The accessible population is often constrained by location (geographical settings), political, socio-economic settings, and researchers' own interest (Sparks & Joyner, 2019). This study used the accessible population. This study targeted locally owned upstream pharmaceutical companies operating in Ghana. The specific location of choice was those pharmaceutical companies located in the capital: Greater Accra. Records available with the Association of Pharmaceutical Companies in Ghana indicate that there were 38 companies in the Ghana whose population stood at 2000 as of December 2020. Thus, the population for this study is 2000 employees.

#### 4.8 Sampling Method

Sampling refers to the process of selecting a subset of individuals, items, or elements from a larger population for the purpose of conducting research (Lohr, 2019; Taherdoost, 2018a). It is

a crucial step in research as it allows researchers to gather data from a manageable and representative sample, which can then be used to make inferences about the larger population. There are two main types of sampling: probability sampling and non-probability sampling (Bhardwaj, 2019; Sharma, 2017; Bryman & Bell, 2015).

#### **4.8.1 Probability Sampling Method**

Sampling methods in research play a pivotal role in ensuring the accuracy and reliability of study findings. Probability sampling, as emphasized by Wiśniowski et al. (2020), is a robust approach where every member of the population has an equal and known chance of being part of the sample. This method allows for the precise calculation of statistical measures and facilitates the generalization of results to the broader population. It is known for its strong theoretical foundation and unbiased estimation of population parameters, although it often demands a substantial sample size to ensure robust outcomes (Wiśniowski, Sakshaug, Perez Ruiz & Blom, 2020). In contrast, non-probability sampling, as discussed by Kohler (2019), is appropriate when researchers can assume homogeneity within the population under study. This method may be employed when specific characteristics or shared traits within the population are of primary interest (Kohler, 2019). Non-probability sampling is less concerned with ensuring equal and known inclusion probabilities for all individuals and is more focused on selecting participants who align with the study's specific objectives. Common probability sampling techniques include simple random sampling, where every individual stands an equal chance of selection, stratified random sampling, involving the division of the population into homogeneous subgroups with random sampling from each stratum, cluster sampling, which selects random clusters from the population, and systematic sampling, where individuals are chosen at regular intervals from an ordered list of the population. These methods are integral to the research process, shaping the quality and applicability of research outcomes.

#### **4.8.2 Non-Probability Sampling Method**

Non-probability sampling stands in contrast to probability sampling as it does not rely on random selection and does not guarantee an equal chance of inclusion for all members of the population (Zhang 2019; Ganesh et al. 2017). This method is commonly preferred in qualitative research or situations where employing probability sampling is not feasible. Several non-probability sampling techniques are available, each serving specific research needs. Convenience Sampling involves the selection of individuals who are readily accessible and available for the study, making it a convenient choice for researchers (Gupta 2020). Purposive

Sampling, on the other hand, focuses on selecting individuals who meet specific criteria or possess characteristics that are highly relevant to the research objectives (Campbell et al. 2020; Crossman 2020). Snowball Sampling is a unique approach that relies on recruiting participants through referrals from initial subjects, creating a network of participants with shared characteristics or interests (Chan 2020; Etikan 2016). Quota Sampling aims to ensure representation of various segments within the population by selecting individuals to meet predetermined quotas based on specific characteristics (Futri, Risfandy & Ibrahim 2022; Iliyasu & Etikan 2021). These non-probability sampling methods provide researchers with a range of options to choose from, allowing them to tailor their approach to the unique demands of their research design and objectives.

The choice of sampling technique depends on various factors such as research objectives, population characteristics, available resources, and time constraints. It is important for researchers to consider the strengths and limitations of each sampling method and ensure that the selected sample is representative and appropriate for the research goals (Gupta 2020; Sharma 2017). The study population is comprised of varied units, however, for the purpose of representativeness both probability and non-probability sampling techniques were employed. The stratified random sampling was used to select the sample for the study in the first instance. There are 38 pharmaceutical firms in Ghana and 30 of these firms are located in the Greater Accra region. Since Greater Accra holds the largest number of pharmaceutical companies the study was centered on the Greater Accra region. The researcher therefore focusses on the entire 30 manufacturing companies in the Greater Accra region for this study.

The sample of companies includes equal number of small, medium and large manufacturing companies; this is to ensure that all spheres of the industry are represented in the sample. The market share of these companies was used to stratify them into small, medium and large companies. From each of the strata, the simple random sampling was used to sample respondents for the study. The simple random sampling within the stratified framework was done under the quantitative aspect of the study.

In the quantitative phase of the study, respondents were selected through a simple random sampling procedure. The assumption was that the researcher had complete access to the entire sample frame since the intended participants were already present on the WhatsApp platforms of their respective companies. This approach ensured that every member had an equal opportunity to take part in the survey, as the online questionnaire link was distributed through

the appropriate channels. The choice of a simple random method was driven by its ease, affordability, and the capacity to generalize findings attributed to the PMAG, aligning with a survey method and quantitative design.

Conversely, in the qualitative dimension of the study, purposive sampling was employed to identify interviewees, specifically the managing directors and heads of procurement from various pharmaceutical companies. Purposive sampling is grounded in the principle that individuals are included in the sample based on their perceived importance to the research, as elucidated by Taherdoost (2018). This approach allowed the study to focus on key individuals whose insights and perspectives were integral to addressing the research objectives. Thus, a total of 12 top executives from the pharmaceutical companies were interviewed. Again, 6 professionals (that is, procurement officers and directors) from state own organizations such as Environmental Protection Agency, Ghana Health Service, and Ministry of Health (MOH) were interviewed in this study.

#### **4.9 Sample size determination**

The sample size will be determined based on two broad approaches: quantitative and qualitative sampling.

- **Sample size determination for quantitative aspect**

When dealing with a vast population, it's impractical to study every element. Thus, researchers select a representative sample from the population, aiming to make inferences and generalizations about the larger population or existing theories (Taherdoost, 2016). Generalizing findings to target populations, based on probability samples, relies on statistical probability (Saunders et al., 2019). However, the adequacy of a sample size to ensure meaningful generalization and avoid biases is crucial (Taherdoost & Brard, 2019). Determining the sample size depends on confidence levels, precision of the estimate, true variability in the data, analysis types, and the size of the target population (Lohr, 2019; Saunders, 2019). Various formulae exist for estimating the appropriate sample size. This study required sample size will be determined using the Yamane (1967) formula:

$$sample\ size = \frac{N}{1 + N(e)^2}$$

Where;

N= Finite Population,  $e$ =alpha value. In this case, the alpha value is 5% (0.05).

Based on the finite population of 2000 employees of indigenous pharmaceutical companies for this study, the sample size is estimated to be 334 for the quantitative aspect of the study.

- **Sample size determination for qualitative aspect**

For the qualitative approach, the purposive sampling technique was used to sample 12 management staff (top executives) and managers and 6 public officials from state organization to provide their expert opinion on Ghana's pharmaceutical sustainable supply chain practices. Thus, 18 participants were purposively selected for the qualitative aspect. The selection of 18 participants corroborates the assertion advanced by Guest, Namey, and Chen (2020) that for qualitative studies using the number between six and seven is enough to capture most themes in a homogenous sample. Sample adequacy in qualitative research is not so much of an issue if there is evidence of data saturation even from one participant (Hennink & Kaiser, 2022; Mason, 2010). As was already said, the goal of this study was to comprehend the significance of top management commitment in guaranteeing the adoption and implementation of sustainable supply chain methods within the Ghanaian pharmaceutical sector. After the data analysis sufficiently captured the important themes and views connected to the study issue, it was decided to include 18 participants.

The total sample for this study was 352 participants for those within the supply chain. The selection of the 18 participants from the public sector as well as the expert from Ghana's pharmaceutical industry is to ensure that expert opinions are curled to aid policy framework adoption and design. These individuals also have experience in the supply chain of the pharmaceutical industry.

- **Inclusion and Exclusion criteria**

For purposes of appreciating the subject matter of sustainable supply chain and its trends, top managers to be selected will be those who have over five years work experience within the upstream pharmaceutical supply chain. This is to ensure that those top managers appreciate and understand the trend in supply chain evolution since the adoption of the sustainable development goals in 2015. Managers who are within the supply chain department, finance and accounting are those to be included.

Exclusion will be done based on the functional areas of managers. Thus, those managers who are within marketing, human resource, and administration would not be part of this study.

- **Recruitment Process**

To recruit participants for this study, an initial introduction letter was presented to the secretary of Ghana Pharmaceutical Manufacturing Association (PMAG), the secretary of the association provided the list of companies to take part in this study. Further call was placed to the individual companies to conduct the study. Screening participant was therefore done to ensure that those who are within the inclusion criteria are chosen. Once participants provide informed consent and meet the eligibility criteria, they were enrolled in the study.

#### **4.10 Research Horizon**

In research, time horizons broadly fall into three categories: longitudinal, cross-sectional, and panel studies. Longitudinal studies involve observing the same individuals or entities over an extended period. Conversely, cross-sectional studies gather data at a single point in time from the same participants (Wang & Cheng, 2020). Panel studies, on the other hand, combine both longitudinal and cross-sectional approaches (Miao, Su & Wang 2020; Bassiouni, Vogel & Archfield, 2016). Longitudinal studies offer insights into changes over time but can be resource-intensive (Bornman, 2016). For this thesis a cross-sectional research horizon was adopted as it involved collecting data from respondents and interviewees at a single point in time. According to Phillips and Pugh (2005), a PhD research study is typically limited in scope and time-constrained, making it unsuitable for a longitudinal approach. Instead, a cross-sectional research design is commonly used to study a specific phenomenon at a given point in time (Wang & Cheng, 2020). This aligns with the chosen research strategy and time horizon, indicating a rational consistency. Additionally, the selected cross-sectional approach is in line with the pragmatist philosophical stance and is well-suited for both qualitative and quantitative data collection techniques (Bryman and Bell, 2015). Therefore, considering these arguments, the cross-sectional approach is deemed the most appropriate time horizon for this thesis.

#### **4.11 Research instruments**

For this investigation, both qualitative and quantitative tools were employed. The tool a researcher employs to directly define or quantify a phenomenon in a practical setting is known as a research instrument (Moyo, 2017; Abawi, 2013). In other words, it outlines the instrument or tools that a researcher plans to employ in order to gather data for the study. The most fundamental types of research instruments include observation, content analysis, questionnaires, and interviews.

- **Quantitative Instrument**  
**Questionnaire**

A questionnaire is a predefined set of written questions to which respondents provide their answers, usually within defined response options (Sekaran and Bougie, 2016). It serves as a tool to collect data by prompting respondents to answer a predetermined set of questions (Saunders et al., 2019). Questionnaire items can be open-ended, closed-ended, or forced, offering flexibility in responses (Saunders et al., 2019). Typically used in quantitative research and survey strategies, questionnaires can be self-administered through various means like weblinks, mail, or in-person interviews conducted by the researcher (Sekaran and Bougie, 2015).

For this research, a structured and closed-ended questionnaire was employed to gather quantitative data, aligning with the study's objectives and design. The data collection was facilitated using an online questionnaire created through Google Forms, a method efficient for large-scale data collection and cost-effective compared to traditional paper-based questionnaires (Hair et al., 2019:204; Ball, 2019:4). Structured questionnaires with closed-ended questions were chosen for their applicability in explanatory research, enabling exploration of relationships, including cause-and-effect (Saunders, 2019; Saunders et al., 2016). The questionnaire for this study was divided into four sections. The first section gathered demographic information such as gender, years of experience, and job positions. The subsequent sections were tailored to address specific research objectives, maintaining a consistent format. The questions encompassed a mix of closed-ended, open-ended, and Likert-scale format, sourced from prior research focusing on upstream pharmaceutical sustainable supply chain management practices and performance indicators (Das 2018; Tzempelikos 2015). The items were all verified materials taken from the body of existing literature. The items assessing each construct have been confirmed to be valid when used to measure the variables in the study model in various research situations. The questionnaire, which included four major components and was estimated to take each participant around 30 minutes to complete, was as follows:

- Section A: Demographic Information
- Section B: Sustainable Supply Chain Management Practices (SSCMP)
- Section C: Sustainable Supply Chain Management (SSCMP) Performance
- Section D: Top management Commitment

- **Section A: Demographic Profiles**

The study gathered key demographic information from respondents in this area, such as gender, number of years working in the pharmaceutical business, and current employment status. The remaining portions of the questionnaire benefited greatly from the context that this demographic information offered.

- **Section B: Sustainable Supply Chain Management Practices (SSCM)**

The analysis of sustainable supply chain management techniques used in the upstream operations of the pharmaceutical sector was covered in Section B. In order to assess respondents' perspectives and experiences with regard to environmental concerns, social responsibility practices, economic considerations, standards, and sustainable sourcing, among other topics, a series of questions and statements were provided to the respondents. Practices were presented in statements and respondents were required to state their degree of agreement or disagreement using the scale below: 1= “strongly disagree (SD)”, 2=“Disagree (D)”, 3=“Neither Agree/Disagree (NAD)”, 4=“Agree (A)”, to 5= “Strongly Agree (SA)”.

- **Section C: Sustainable Supply Chain Management (SSCMP) Performance**

The upstream activities of the pharmaceutical industry were the focus of Section C, which evaluated the performance results linked to sustainable supply chain management strategies. Respondents were questioned about how these practices affected efficiency, cost-effectiveness, and stakeholder satisfaction, among other aspects of organizational performance. Like Section B, this section featured a mix of closed-ended and Likert-scale questions to capture respondents' degree of agreement or disagreement using the scale: 1= “strongly disagree (SD)”, 2=“Disagree (D)”, 3=“Neither Agree/Disagree (NAD)”, 4=“Agree (A)” to 5= “Strongly Agree (SA)”.

- **Section D: Top Management Commitment**

The evaluation of senior management's commitment to sustainable supply chain management methods was the emphasis of Part D, the last section. Its goal was to comprehend how senior executives support and facilitate sustainable activities inside the company. This section featured closed-ended questions and on top management's influence using the Likert scale where 1= “strongly disagree (SD)”, 2=“Disagree (D)”, 3=“Neither Agree/Disagree (NAD)”, 4=“Agree (A)” to 5= “Strongly Agree (SA)” for various statements.

The study purpose, the research questions, the design, and the strategy are frequently taken into consideration while choosing one or more distinct research instruments. For instance, the data for this study was gathered using a survey strategy, and the study was developed utilizing an explanatory, concurrent parallel mixed method approach. Self-administered questionnaires were employed for the quantitative phase, and structured interviews were used to gather the qualitative data.

The items used in this study to measure the constructs were designed and utilized mostly in Western cultures, however it is crucial to note that they are flexible and appropriate in all situations. In this study, the questions were altered and tailored to the Ghanaian pharmaceutical industry's environment as an emerging country, and they were then presented to gauge the research framework's variables.

- **Qualitative Instrument**

- **Interviews**

Interviews are a commonly utilized qualitative research instrument, involving purposeful interactions between the researcher and participants, where the interviewer poses clear and concise questions and attentively listens to the interviewee's responses (Saunders et al., 2019 Sekaran and Bougie, 2016). These interactions can occur face-to-face, over the phone, or online, categorized into structured, semi-structured, or unstructured interviews (Saunders et al., 2019 Sekaran and Bougie, 2015).

Structured interviews follow a predetermined sequence of questions for each session, maintaining consistency to minimize potential bias and ensure response comparability across interviews (Hair et al., 2019). Conversely, unstructured interviews involve open-ended discussions, allowing the interviewer to explore the phenomenon in-depth without following a specific question sequence (Hair et al., 2019). Semi-structured interviews strike a balance by offering a predetermined structure with room for flexible, unstructured questioning. Overall, interviews provide valuable insights into what is essential and relevant to specific problem situations, offering in-depth information about variables of interest (Sekaran and Bougie, 2015).

The structured Interview guide is designed in two forms: for upstream pharmaceutical companies and for officials of public sector institutions. Generally, issues covered in the guide include upstream pharmaceutical sustainable supply chain management practices in Ghana,

performance of pharmaceutical companies in Ghana, role of top executives in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana, and the role of the upstream pharmaceutical policy framework. It was anticipated that every interview session would take an hour to complete. The interview was conducted in the premises of the various companies selected.

The interview instrument for Upstream Pharmaceutical Companies (Top management) covered the following issues:

- Level of upstream pharmaceutical sustainable supply chain management practices in Ghana.
- How upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana.
- The role of top executives in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana.
- The role of the upstream pharmaceutical policy framework of Ghana on the supply chain on sustainability practices in the upstream.

The structured Interview Guide for Public Sector Officials covered questions on sustainable supply chain practices, government and government organizations effort at sustainable supply chain practices, and policies that guide supply chain sustainability practices in the pharmaceutical upstream.

### **Choice and design of the qualitative instrument**

Based on concurrent/parallel mixed methods design adopted, this study combines quantitative and qualitative data. The choice to employ both an interview guide and a questionnaire in this study was deliberate and based on the inherent strengths and complementary nature of each method (Harvard Catalyst, 2023; Dawadi et al., 2021). The questionnaire, divided into sections with specific objectives, allowed for the efficient collection of quantitative data from a large sample, enhancing generalizability across the pharmaceutical industry in Ghana. By including a closed-ended and Likert-scale questions, it facilitated the collection of precise, structured responses while also capturing nuanced insights and attitudes (Flick, 2018; Schoonenboom & Johnson, 2017). The questionnaire's questions were drawn from established research, ensuring their validity and appropriateness for the study's objectives.

On the other hand, the structured interview guide provided a platform for in-depth exploration of critical aspects such as sustainable supply chain management practices, company

performance, and top management commitment (Creswell & Creswell, 2018b; Schoonenboom & Johnson, 2017). Interviews were designed for both upstream pharmaceutical companies and public sector officials, offering a comprehensive view of the industry. The face-to-face interviews allowed for a deeper understanding of the respondents' perspectives and experiences, uncovering qualitative insights that complemented the quantitative data obtained through the questionnaire (Creswell & Creswell, 2018a; Chu & Chang, 2017). By utilizing both methods, the study achieved a holistic approach, capturing a broad range of data, from quantitative trends to qualitative insights. This dual approach enriched the research by providing a multifaceted understanding of sustainable supply chain management practices and their impact on performance in the pharmaceutical sector of Ghana.

#### **4.12 Data Collection**

Data is unprocessed unaltered information that has been gathered from primary and secondary sources (Moyo, 2017; Bryman & Bell, 2015). The type of study quantitative or qualitative determines the data gathering techniques to be employed. Primary data is regarded as information that the researcher learns from study participants, whereas secondary data is information that already existed but was not gathered by the user (Surbhi, 2016; Jadon, 2015).

Research data collection refers to the process of gathering information or data to address research objectives and answer research questions. It is a critical stage in the research process as the quality and relevance of the collected data directly impact the validity and reliability of the research findings. There are several methods and techniques for collecting research data, depending on the nature of the research study and the type of data required. Common methods of primary data collection include (Bryman & Bell, 2015):

- Surveys: Questionnaires or structured interviews are used to collect data from a sample of participants. Surveys can be conducted in person, via mail, telephone, or online.
- Interviews: In-depth interviews, either face-to-face or through phone or video calls, are conducted to gather detailed information and insights from individuals or groups.
- Observations: Researchers directly observe and record behaviours, interactions, or events in natural or controlled settings. Observations can be participant (researcher actively involved) or non-participant (researcher only observes).

- Experiments: Controlled experiments are conducted to study cause-and-effect relationships by manipulating variables and measuring their effects on the outcome. Common sources of secondary data include:
- Published sources: Research articles, books, reports, and government publications provide valuable data and information related to the research topic.
- Official statistics: Government agencies and organizations collect and publish data on various socio-economic indicators, demographics, and other relevant variables.
- Databases: Online databases provide access to a wide range of academic journals, research reports, and statistical data.
- Historical records: Historical documents, archives, and records can be used for research that requires historical analysis.

Researchers may combine both primary and secondary data collection methods in a mixed methods approach to gain a comprehensive understanding of the research topic (Creswell & Creswell, 2018b; Flick, 2018; Bryman & Bell, 2015). When collecting research data, it is important to ensure the data is reliable, valid, and ethical. Researchers should consider factors such as sample size, data quality, data security, informed consent, and confidentiality. Data collection instruments should be carefully designed, pretested, and validated to ensure accurate data collection. Data collection procedures should be documented and well-documented to ensure reproducibility and transparency (Berryman, 2019; Creswell & Creswell, 2018b; Bryman & Bell 2015).

This study used structured interview guide and structured questionnaire as primary instrument for data collection. Formal letter of introduction from the University was presented to the pharmaceutical Association of Ghana which is the umbrella body of the pharmaceutical companies in Ghana. According to the industry's regulation a formal approval for data collection from individual firms was given by the association secretary which paved way for the data collection. Secondary data was collected from journals, reports and newsletters of the study.

### **Method of quantitative data collection**

To collect data from participants, this study first designed the questionnaire on google forms and distribute to participants under the quantitative design framework. Before distributing the

initial survey questionnaire, permission from the Pharmaceutical Manufacturers Association of Ghana (PMAG) was obtained, acting as a gatekeeper. This approval confirmed that the researcher had the authorization to gather primary data from PMAG members. Following this approval, facilitated by the PMAG Secretary, the researcher engaged with HR managers to discuss the questionnaire's structure and the specific elements to be assessed. As the questionnaire was designed for online administration, consent was sought to use the official WhatsApp platforms of the respective companies to share the questionnaire. Within each company, a hyperlink to the questionnaire was provided to a designated HR officer, chosen purposefully due to their experience with academic research.

The HR officers were responsible for disseminating the questionnaire link on the company's official WhatsApp platform, allowing respondents to access the web-based questionnaire using their smartphones or tablets. Additionally, the researcher-maintained communication with the HR officers, reminding them periodically through phone calls and WhatsApp messages to encourage their colleagues to participate. The HR managers were kept informed of the progress, receiving weekly updates on the number of completed questionnaires to motivate continued data collection efforts. The initial data collection phase spanned four weeks, with the questionnaire link closed once the obtained data met the minimum anticipated sample size. The second round of data collection followed a similar process four weeks after the first phase's closure.

### **Method of qualitative data collection**

The researcher conducted a personal interview with experts of the selected pharmaceutical companies so as to obtain a first-hand information so as to understand the research problem. The interview instrument was used to collect information during interview sessions for the qualitative aspect. The interview sessions were scheduled at the convenience of the various managers and procurement officials. Face-to-face encounters were used for all interviews. The researcher scheduled appointments for interviews with 12 management staff (top executives) and managers of 6 public officials from state organization to provide their expert opinion on Ghana's pharmaceutical sustainable supply chain practices. Thus, 18 participants were included in the qualitative aspect. The sampled managers who were chosen for the interview received an email containing the interview procedures five days prior to the interview. The interviews in this study were conducted with the agreement of the respondents and recorded using the researcher's mobile phone recorder. Notes were also taken during the interviews. The

interviews were conducted with top executives and 6 public officials from state organizations in their respective offices, with no other persons present and no disruptions. Every day, three interviews were done. On average, each interview lasted one hour. Immediately following the conclusion of the interviews for the day, the data gathered for that day was transcribed. It took many hours to transcribe the interviews from each day. Thus, interviews with the remaining participants were held every other day. As a result, the interviews took six days to complete. Due to the small number of respondents, their transcribed notes were delivered to them over WhatsApp so they could confirm that their comments had been accurately captured.

#### **4.13 Data Analysis**

Both qualitative and quantitative framework for analyzing data were employed with the view of providing a better appreciation of the Sustainable supply Chain Management practices on performance outcomes. The qualitative analytic method comprised the discursive and thematic analysis while the quantitative analytic method covered the application of structural equation modelling. Data was presented in tables, charts, and text.

##### **Qualitative data analysis procedure**

Braun and Clarke (2006) developed a widely used approach to thematic analysis in qualitative research. Their six-step process provides a systematic framework for conducting and reporting thematic analysis (Braun & Clarke 2006).

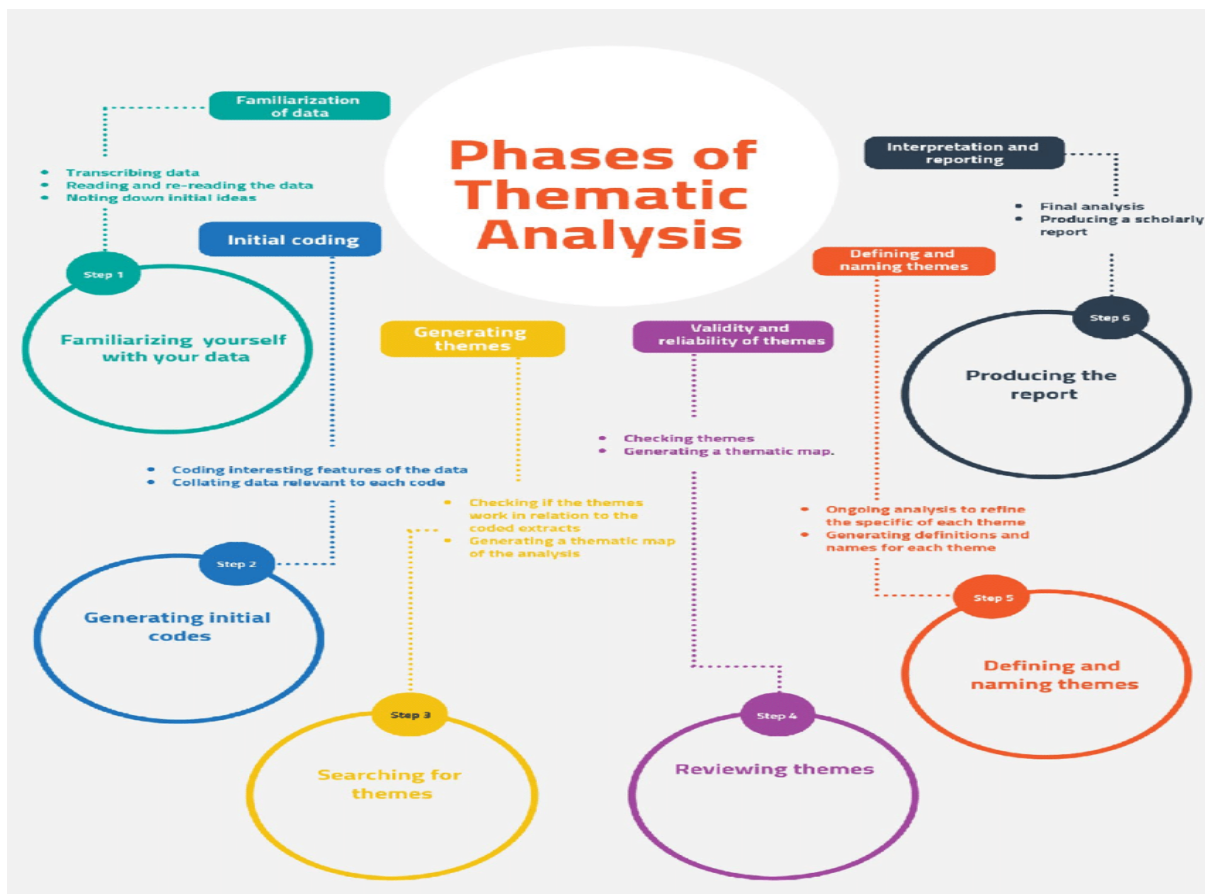
Braun and Clarke's approach:

1. Familiarization with the data: Begin by immersing yourself in the data to gain a deep understanding of the content. Read and re-read the data, such as interview transcripts or textual documents, to become familiar with the material.
2. Generating initial codes: Start the coding process by systematically identifying and labeling meaningful units of information in the data. Codes should capture the essence of the data and represent different aspects, perspectives, or concepts.
3. Searching for themes: Look for patterns and connections within the codes to identify potential themes. Themes are overarching patterns or concepts that capture important aspects of the data. They should be coherent and have a clear relationship to the research question or objective.

4. Reviewing themes: Review and refine the identified themes by gathering and organizing relevant coded data extracts under each theme. Compare and contrast the data within and across themes to ensure they are distinct and coherent. Consider the relationships and hierarchy between themes.

5. Defining and naming themes: Develop clear definitions and descriptions for each theme to capture their essence. Name the themes in a way that accurately represents their content and meaning. The names should be concise, meaningful, and easily understandable.

6. Reporting and interpreting themes: Finally, write a narrative or analytical account of the identified themes, supported by illustrative quotes or excerpts from the data. Interpret and analyze the themes in relation to the research question, relevant theory, and literature. Present a coherent and insightful interpretation of the data. Figure 4.7 presents the Phases of Thematic Analysis in the next page.



**Figure 4. 7 Phases of Thematic Analysis**

Source: Braun & Clarke, (2006).

Braun and Clarke's approach emphasizes the iterative nature of thematic analysis and encourages researchers to engage in constant comparison, reflexivity, and in-depth analysis of the data. It provides a systematic framework for conducting rigorous and meaningful thematic analysis in qualitative research (Braun & Clarke, 2006).

Thematic analysis was selected as the analytical approach for this study due to its ability to organize and analyze data based on meaningful themes (Byrne, 2022; Nowell, Norris, White & Moules, 2017; Braun & Clarke, 2006). This method allows for a comprehensive and precise examination of words and statements, offering flexibility to identify patterns within text-based data (Kiger & Varpio, 2020; Braun & Clarke, 2006, 2019). Thematic analysis finds application in both the positivist/quantitative and qualitative paradigms (Braun and Clarke, 2020). Given the study's objective to provide explanatory insights and understanding of the quantitative findings, thematic analysis proves to be a suitable choice for this research.

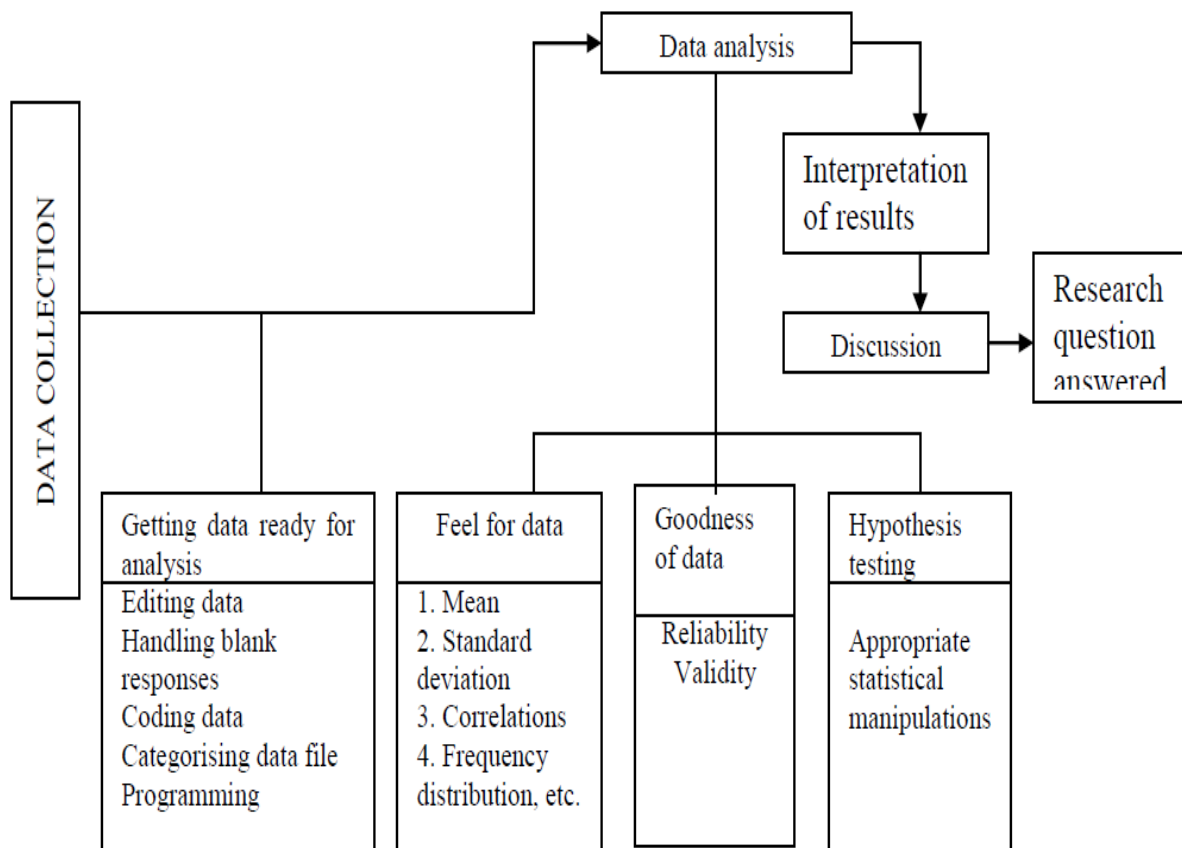
One crucial quality criterion for evaluating thematic analysis involves clearly specifying the theoretical foundations guiding its application (Braun & Clarke, 2019). Thematic analysis is grounded in either a deductive or an inductive approach. The deductive approach involves creating codes based on a predefined conceptual framework, theoretical constructs, or codebook (Byrne, 2022; Braun & Clarke, 2019). Conversely, the inductive approach generates codes that align with the content of the data, devoid of any pre-existing theory or framework (Byrne, 2022; Braun & Clarke, 2019). In this study, a deductive approach was employed for thematic analysis, focusing on exploring data for themes related to the study's quantitative outcomes (Braun and Clarke, 2020). As mentioned earlier, Braun and Clarke (2021) have outlined a six-phase process for engaging with data, coding, and developing themes. However, this process is flexible, allowing for phases to merge as the analytical process iteratively unfolds (Braun & Clarke, 2019, 2021).

Utilizing thematic analysis as the analytical method significantly bolstered the credibility of the findings, enabling a systematic organization and interpretation of the data to uncover meaningful patterns and themes (Braun and Clarke, 2020). The structured six-phase process for data engagement, coding, and theme development provided a rigorous and methodical approach, reducing researcher bias and enhancing the dependability of the results.

To further enhance the credibility and dependability of the qualitative data, the researcher engaged in data familiarization and transcribed the recorded interviews verbatim, ensuring a

comprehensive understanding of both the content and context of the data (Guest, MacQueen & Namey, 2014). Additionally, conducting face-to-face interviews allowed for a deeper level of data collection, leveraging nonverbal cues and ensuring the accuracy of the transcribed notes (Basit, 2003). Transparency and support for the identified themes were further provided through the use of word frequency queries and the presentation of evidence via extracts from the interview data, enhancing the confirmability of the findings (Byrne, 2022).

For transferability, the qualitative data's robustness is augmented through a detailed description of the research context, sampling process, and data collection procedures. The diverse selection of participants from various top level managerial roles enriches the captured perspectives, allowing for potential transferability to analogous contexts (Riazi, Ghanbar & Rezvani, 2023). To ensure confirmability, the researcher applied both semantic and latent coding, offering insights into both explicit and implicit meanings within the responses (Olmos-Vega, Stalmeijer, Varpio & Kahlke, 2023). The adoption of a deductive approach to thematic analysis aligns precisely with the research questions, enabling a focused exploration of themes linked to the quantitative outcomes (Braun and Clarke, 2020). To examine the nature, scope, and practices of upstream pharmaceutical sustainable supply chain management, interview responses from government officials and top executives of pharmaceutical companies were coded and through thematic analysis, themes were raised for discussion. Patterns in the quotations on the issue of upstream pharmaceutical sustainable supply chain management practices, policy and legal framework were developed through thematic analysis technique. Sekaran (2003) also used a graphic to visually summarize the data analysis process, as seen in the Figure 4.8:



**Figure 4. 8 Data Analysis Process**

Source: Sekaran (2003:301)

The process of qualitative data analysis began with the transcription of the data collected. After data transcription, it was entered into the ATLAS.ti qualitative software to ensure that responses and quotations to be generated are accurate and consistent with the views of the interviewees. Since Sustainable supply Chain Management practices and performance outcomes have been empirically established in literature, this study adopted the deductive coding technique. Thus, the current study sought to confirm SSCM practices that have already been identified in extant literature. The code manager in ATLAS.ti was used. This ensured that predetermined codes such as responsible sourcing, green manufacturing practices, packaging and waste management, supplier engagement and partnerships, and socially inclusive practices were used. Quotations and or responses that reflected each of the identified practices were categorized under their respective themes for clearer appreciation and understanding of the various SSCM practices deployed by the firms.

- **Quantitative Analysis**

There are two ways to analyze quantitative data: either by using descriptive statistics to comprehend the facts, or by applying statistical tests to evaluate hypotheses. The quantitative analysis technique adopted for this study is the structural equation modelling (SEM) technique. The choice for SEM is its advantage to measure relationship among variables using both latent and manifest factors. Thus, a structural framework analysis on the sustainable supply chain management practices and performance were estimated. Reliability and validity estimation of variables were estimated using the Cronbach's alpha, average variance extracted (AVE) and the Heterotrait-Monotrait Ratio of Correlations HTMT) (Hair, Hult, Ringle & Sarstedt, 2017; Leguina, 2015). For statistical analysis of empirical data, there are several methods or programs available. These technologies include, among others, the Statistical Package for Social Science (SPSS), JASP, Jamovi, WarpPLS, and SmartPLS. This study used Statistical Package for Social Science (SPSS) and Jamovi software for the analysis of quantitative data.

#### **4.14 Pilot Study**

A pilot study is a small-scale preliminary investigation conducted before the main research study to test and refine the research design, data collection instruments, and procedures (Srinivasan & Lohith, 2017). It holds significant importance in research as it allows researchers to evaluate the feasibility, reliability, and validity of the methodology. By conducting a pilot study, researchers can identify any potential challenges, flaws, or limitations in the research design and make necessary adjustments and improvements (Dźwigoł, 2020). This helps to enhance the overall quality and validity of the study by ensuring that the research instruments are reliable and valid, the data collection procedures are effective, and the research design is well-suited to the research objectives (Dźwigoł, 2020). Additionally, a pilot study helps to estimate the appropriate sample size, allowing researchers to determine the number of participants needed for the main study (Dźwigoł, 2020). It also provides researchers with an opportunity to become more familiar with the research setting, enabling them to fine-tune their approach and address any practical considerations or logistical issues. By addressing these aspects through a pilot study, researchers can enhance the success and credibility of their main study, ensuring that the research outcomes are accurate, reliable, and meaningful (Dźwigoł, 2020) In order to ascertain the validity and effectiveness of the study instrument in capturing the intended constructs and achieving the established objectives, a pilot survey was conducted to pre-test the draught questionnaire and interview. The purpose of this pre-testing was to

identify and address any potential issues, as well as to gain a deeper understanding of the items included in the instruments. The pilot survey for the quantitative element of this study involved a sample of 35 officials from a reputable pharmaceutical company in Ghana. The aforementioned numerical value corresponds to 10% of the projected sample size, aligning with previous studies as reported by Dźwigoł (2020) and Srinivasan and Lohith (2017). The officials employed by Pharmaceutical were selected due to their direct involvement in supply chain operations within the pharmaceutical manufacturing sector in Ghana. In the initial stage of the pre-test, the respondents were physically administered a hard copy of the questionnaire. Participants were instructed to engage in a reading activity where they refrained from providing answers to the presented items. Additionally, they were requested to mark an asterisk next to each item that posed comprehension difficulties. Subsequently, these elements were deliberated upon in focus-group sessions and subsequently adjusted in accordance with the feedback received. The necessary modifications were made to the Google form, and the corresponding web link was distributed to the participants via their WhatsApp platforms. The participants need an average of 30 minutes to fully respond to the questionnaire. It is imperative to acknowledge that the alterations made were of a modest nature and did not substantially impact the intended semantics of the entities. Furthermore, the pilot study was conducted to verify the comprehensibility and accuracy of the adapted validated items, which were derived from prior influential studies (Leeuw et al., 2012). The objective was to establish the validity of the instrument in order to minimise potential difficulties for the targeted respondents when completing the questionnaire (Saunders et al., 2019). Furthermore, the pilot test evaluated the potential dependability of the data pertaining to each construct, utilizing the data collected from the pre-test (Saunders et al., 2019). Therefore, during the pilot test, the questionnaire items were adjusted and modified in order to enhance clarity and comprehensibility. The interview guide pilot involved 3 senior staff members from a well-known pharmaceutical company and 2 officials from public institutions in Ghana. Pre-test interviews were conducted with these individuals to ensure the interview guide was concise and meaningful in addressing the study objectives. The interview protocols were sent to the respondents a day before the interviews took place, and each interview section lasted for approximately one hour. The pre-test interviews were held at the premises of the respondents' respective companies. Therefore, the total sample for the pilot study was 40 top executives. Finally, the result of the pre-test was excluded from the main dataset.

#### **4.15 Delimitations/scope**

The entire study was conducted within the southern part of the country where it is comparatively easier to move about and collect data. Again, the greater Accra region of the country has a lot of the pharmaceutical companies. Within the various pharmaceutical companies, those that form part of the study were those that deal directly with procurement and supply chain activities.

#### **4.16 Validity and reliability/trustworthiness**

To ensure that the study specifically attains its objective, the study instruments were examined for their validity and reliability. Validity of study can be described as the degree to which the criteria of the scientific research method have been followed during the process of producing research findings.

Validity is a mandatory condition for all forms of studies (Taherdoost, 2018b). This study leveraged on the expertise of the supervisors to ensure the face validity of both the measurement instrument for both the qualitative and the quantitative aspects of the study. Reliability relates to the degree to which the exact results can be produced using the same instruments more than one time. Simply put, if the study is associated with a high degree of reliability, then other researchers need to be able to achieve the same findings using the same research methodology under similar conditions (Taherdoost, 2018b; Mohamad, Sulaiman, Sern & Salleh, 2015).

- **Quantitative Reliability and Validity**

To ensure constructs reliability in the quantitative aspect of this study, the Cronbach's alpha, the most frequently used reliability estimate, which "measures internal consistency reliability, thus, the degree to which responses are consistent across the items within a single measure" were estimated (Raykov, Gabler & Dimitrov, 2016; Bonett & Wright, 2015).

- **Qualitative Reliability and Validity**

In qualitative aspect, this study ensured that there is trustworthiness of the data collected by ensuring that there was clear and systematic process in data collection. Essentially, the participants were asked to voluntarily check the final report to ensure that their perspectives and experiences have been accurately represented. Member checking helped to increase the validity of the data collected. Other colleagues and senior researchers were also consulted for their expert peer review of the report of this study to ensure that the research was sound and reliable.

#### **4.17 Anonymity and confidentiality**

Anonymity is a condition in which the identity of individual subjects is not known to researchers. Since the study involves sensitive matters within the corporate environment, this study made sure that the personality or names of the respondents chosen were not disclosed. This is done to protect the person of the respondents. Confidentiality refers to a situation under which a researcher is aware of the identity of a research subject but takes action to shield that identity from being identified by others. Thus, the study ensured that no harm is suffered by the respondents as a result of their participation in this study. No respondent was required to write his or her name on any of the questionnaires. Again, necessary pseudonyms were used to identify the interviews in the study.

#### **4.18 Ethical considerations**

Adhering to ethical standards is a foundational aspect of conducting quality research, ensuring that the rights and welfare of individuals involved or affected by the research are upheld (Saunders et al., 2019). Several ethical procedures were diligently followed in this study to maintain high ethical standards. Firstly, gatekeeper permission and a formal letter of permission were obtained from the Pharmaceutical Manufacturers Association of Ghana prior to data collection. This ensured that the researcher had authorization to gather data from the PMAG and affirmed that the data would be used for its intended purpose. Additionally, ethical clearance was obtained from the Institutional Research Ethics Committee (IREC) of the Durban University of Technology, validating that the research adhered to ethical requirements.

Participants' consent was diligently sought before their engagement in the survey. The questionnaire included a self-generated digital code on the title page, serving as participants' consent to access the survey. They were informed of the voluntary nature of their participation, assured of confidentiality and anonymity, and provided with contact information for any inquiries or concerns.

Ensuring the protection of participant confidentiality and privacy was of paramount importance, as explicitly communicated at the outset of the study through a statement on the questionnaire and interview guide, assuring participants that anonymity would be upheld and their information solely used for academic purposes. To further safeguard respondents, non-identifiable questionnaires and pseudonyms devoid of personal identifiers were employed. Participants were thoroughly informed about the research's objectives, its sponsors, and the study's overarching goals, and their consent was diligently obtained through the signing of a

consent letter before their participation. Recognizing the responsibility to maintain ethical standards, permission for the research was diligently sought, acknowledging the university's accountability to the broader community in the event of any societal harm resulting from the study. This research rigorously adhered to the ethical requirements of the Durban University of Technology and higher qualification regulations, with due recognition and referencing of all appropriate acknowledgment and referencing with due recognition and referencing of all borrowed works from other scholars.

Safeguarding data and ensuring privacy were crucial ethical considerations. Measures were implemented to protect both quantitative and qualitative data, restricting access and ensuring secure storage. Data generated electronically was stored securely with password protection and would be deleted in compliance with institutional guidelines after five years. Lastly, the accurate reporting of research outcomes and proper citation of literature were paramount ethical obligations, ensuring the reliability and integrity of the study.

In summary, this study meticulously followed ethical procedures, obtaining necessary permissions, respecting participants' autonomy, safeguarding data, and upholding honesty and transparency in the research process (Saunders et al., 2019).

Table 4. 1 Ethical Issues

1	<i>This study did not in any way coax the respondents into taking part in this study.</i>
2	<i>A consent form was designed and presented to all potential respondents for their informed consent before taking part in this study.</i>
3	<i>Again, respondents were made aware that they have the option to opt out of the study when they are completing the questionnaire or taking part in the interview session if they find out that they are being coaxed or under duress to participate in this study</i>
4	<i>Data storage: The researcher ensured that the data collected is stored securely and that access to the data is limited to authorized individuals only.</i>
5	<i>To ensure the confidentiality of the data, the researcher should remove any identifying information from the data before storing it. This includes removing any names, addresses, phone numbers, or other identifying information that could link the data to a specific individual. Additionally, the researcher used a secure storage system, such as a password-protected computer or encrypted storage device, to store the data.</i>

#### 4.19 Methodology Chapter Summary

The methodology provides a comprehensive discussion of the underpinning design and strategies, aimed at exploring sustainable supply chain management practices' impact on performance in the pharmaceutical industry. The chapter provided the target population, carefully selected a sample of 352 participants using scientific guidance, employed stratified and purposive sampling, and utilized structured questionnaires and interview guides in our descriptive survey. Reliability was assessed via Cronbach's alpha, validity through a pilot study, and data underwent SPSS and Likert scale analysis for quantitative data and thematic and discursive analysis for qualitative data, alongside structural equation modeling. Ethical considerations, including informed consent, confidentiality assurances, and university approval, were rigorously upheld. The following chapter will present findings, data analysis, and conclusions derived from our meticulously collected and analyzed data, shedding light on the influence of sustainable supply chain management practices on pharmaceutical industry performance. The following chapter details the results of the research the researcher also interprets and discusses researcher's findings.

Critical issues of data collection, data analyses and ethical considerations were all provided. Table 4.2 presents the chapter summary.

*Table 4. 2 Chapter Summary*

<b>Topic</b>	<b>Description</b>
Research Philosophy	Pragmatist
Research Purpose	Concurrent/Parallel Mixed Methods
Study Population	2000
Sampling Technique	Stratified Random Sampling and Purposive Sampling
Data Types and Sources	Primary and Secondary
Methods of Data Collection	Structural Questionnaire and Interview
Field Problems	Difficult to find Participants

Ethical Consideration	Pseudo Names used for the Companies due to Confidentiality
Research Validity and Reliability	Member Checking and Rich Thick Description Reliability: Audit Trail
Data Analysis	Structural Equation Modelling for Qualitative and Thematic Analysis Technique for Qualitative

## CHAPTER FIVE

### RESULTS AND DISCUSSION

#### 5.1 Introduction

In this section of the study, the researcher made a clear and concise presentation of the results, using tables, graphs, and figures to enhance clarity. Statistical measures such as mean, standard deviation, and p-values were provided. In the discussion section, the researcher interpreted and analyzed the results, discussing their implications and significance. The researcher aligned findings with the research objectives and hypotheses, identifying patterns, trends, or relationships observed in the data. The interpretation was supported by references to relevant literature and theories, demonstrating its grounding in existing knowledge. The result of the study was based on the research objectives set out in chapter one. Data was presented starting with the qualitative aspects of covering objectives 1 and 2. This was followed by the quantitative aspects of the study, thus covering objectives 3 and 4. Results on the hypotheses were also presented.

#### 5.2 Qualitative Results

Under the qualitative results, the focus was to assess the state of the upstream pharmaceutical sustainable supply chain management practices in Ghana (objective 1) and to assess the role of the upstream pharmaceutical policy framework of Ghana on the supply chain sustainability (objective 2).

**Table 5. 1 Interviewees Background Information**

<b>Interviewee Characteristics</b>	<b>Description</b>	<b>Frequency</b>
<b>Gender</b>	<b>Male</b>	<b>15</b>
	<b>Female</b>	<b>3</b>
<b>Age Bracket</b>	<b>30 to 40 years</b>	<b>12</b>
	<b>41 to 50 years</b>	<b>4</b>
	<b>51 to 60 years</b>	<b>2</b>
<b>Total Participants</b>		<b>18</b>

### **5.2.1 State of the upstream pharmaceutical sustainable supply chain management practices in Ghana**

Interviewing 18 officials from various upstream pharmaceutical companies, thematic issues that depict the adoption of upstream pharmaceutical sustainable supply chain management practices in Ghana included responsible sourcing, green manufacturing, packaging and waste management, supplier engagement and partnerships, among others.

The interview revealed that pharmaceutical companies were increasingly focusing on responsibly sourcing raw materials and ingredients. This involved ensuring suppliers adhere to ethical and environmental standards, such as good manufacturing practices (GMP), and avoiding the use of ingredients derived from endangered species or unethical practices. Some of the statements that support the responsible sourcing are provided below:

*"Responsible sourcing is a top priority for our company. We understand the importance of ethical and sustainable practices in the pharmaceutical industry. By working closely with our suppliers, we ensure that our raw materials are sourced responsibly, complying with environmental regulations and promoting social responsibility." (Supply Chain Manager, 2023).*

*"As a pharmaceutical company operating in Ghana, we recognize the significance of responsible sourcing. It goes beyond compliance; it's about fostering transparency, respecting human rights, and preserving biodiversity. Through partnerships with our suppliers, we strive to create a sustainable supply chain that benefits local communities and the environment." (Sustainability Officer, 2023).*

*"In today's globalized pharmaceutical industry, responsible sourcing is a crucial aspect of our operations. We must ensure that our supply chain upholds high ethical standards and environmental stewardship. Through active engagement with suppliers and adherence to certifications, we demonstrate our commitment to sustainability and build trust with stakeholders." (Regulatory Affairs Manager, 2023).*

*"Responsible sourcing is a fundamental principle that drives the sustainable development of the pharmaceutical industry in Ghana. By sourcing raw materials ethically and sustainably, we contribute to preserving our natural resources, supporting local communities, and ensuring the long-term availability of vital medicines." (Director of Sustainability and Corporate Social Responsibility, 2023).*

*"At Ghana Ethical Pharma, responsible sourcing is at the core of our business model. We believe that ethical practices and sustainability go hand in hand. By sourcing ingredients from verified and socially responsible suppliers, we not only deliver safe and effective medicines but also contribute to the socio-economic development of local communities." (CEO, 2023).*

*"Responsible sourcing is a key consideration in the regulatory framework for pharmaceutical companies in Ghana. We encourage companies to ensure the integrity and quality of their products by sourcing raw materials from suppliers who adhere to international standards and demonstrate social and environmental responsibility." (Head of Regulatory Affairs, 2023).*

Another practice that sufficed is green manufacturing within the upstream pharmaceutical industry. Sustainable manufacturing practices aim to reduce energy consumption, water usage, and waste generation. This can include the adoption of energy-efficient technologies, waste management systems, and recycling initiatives. Participants had this to say;

*"Green manufacturing practices offer numerous benefits to pharmaceutical companies in Ghana. By optimizing energy and water usage, minimizing waste generation, and reducing emissions, these practices not only help protect the environment but also enhance operational efficiency, reduce costs, and promote sustainable growth." (Supply Chain Manager, 2023).*

*"Incorporating green manufacturing practices in our operations has been transformative. Through process optimization, waste reduction, and the use of environmentally friendly technologies, we have not only reduced our environmental footprint but also improved product quality, employee morale, and overall operational performance." (Production Manager, 2023).*

*"Green manufacturing practices are integral to ensuring the safety, efficacy, and quality of pharmaceutical products. By prioritizing environmentally friendly manufacturing processes, we not only meet regulatory requirements but also contribute to the well-being of patients and society as a whole." (Procurement Manager, 2023).*

*"The adoption of green manufacturing practices by pharmaceutical companies in Ghana is crucial for a sustainable future. By embracing cleaner and more efficient manufacturing processes, we reduce resource consumption, minimize waste, and protect human health and the environment. It's a win-win situation for both the industry and society." (Sustainability Manager, 2023).*

*"Green manufacturing practices in the pharmaceutical industry are closely linked to innovation and product development. By investing in sustainable technologies and research, we can develop more eco-friendly formulations, reduce the environmental impact of our products, and create a positive change in healthcare." (Head of Research and Development, 2023).*

Packaging and waste management was also identified as one of the practices under sustainable supply chain management within the pharmaceutical industry. Pharmaceutical companies were working towards reducing the environmental impact of packaging materials by using recyclable or biodegradable materials and minimizing packaging waste. Proper disposal and recycling of pharmaceutical waste are also important to prevent environmental contamination. Some of the supporting statements are:

*"Efficient packaging and waste management practices are critical for the pharmaceutical industry in Ghana. By adopting sustainable packaging materials and implementing proper waste segregation, recycling, and disposal methods, we can minimize environmental impact, reduce landfill waste, and promote a circular economy." (Environmental Compliance Officer, 2023).*

*"Packaging plays a crucial role in ensuring product integrity and patient safety. By implementing sustainable packaging solutions, such as recyclable or biodegradable materials, we can reduce waste, conserve resources, and contribute to a more environmentally conscious pharmaceutical industry." (Quality Assurance Manager, 2023).*

*"Effective waste management throughout the pharmaceutical supply chain is essential. By implementing proper waste segregation, recycling initiatives, and collaborating with waste management partners, we can minimize the environmental impact of packaging waste and promote a sustainable distribution system." (Supply Chain and Logistics Manager, 2023).*

*"Effective packaging and waste management practices are not only environmentally responsible but also align with regulatory requirements. By complying with waste disposal regulations and implementing sustainable packaging solutions, pharmaceutical companies in Ghana ensure compliance while reducing their ecological footprint." (Regulatory Affairs Specialist, 2023).*

*"Sustainable packaging practices offer numerous benefits for pharmaceutical companies. By reducing packaging waste, optimizing packaging sizes, and using eco-friendly materials,*

*companies can achieve cost savings, enhance logistics efficiency, and improve their overall environmental performance." (Operations Manager, 2023).*

Supplier engagement and partnerships has become very integral in ensuring the attainment of sustainable supply chain management. Companies were increasingly collaborating with suppliers, distributors, and other stakeholders to promote sustainability throughout the supply chain. This includes sharing information, setting common sustainability goals, and implementing traceability systems to ensure transparency and accountability. Interviewees confirmed the instance of Supplier engagement and partnerships with some of the following statements:

*"Supplier engagement and partnerships are essential for fostering sustainable practices in the pharmaceutical industry. By collaborating closely with our suppliers, we can promote ethical sourcing, share best practices, and drive continuous improvement in areas such as environmental responsibility and social compliance." (Procurement Manager, 2023).*

*"Engaging with suppliers and forming partnerships based on shared values and sustainability goals is a key driver for responsible sourcing. Through ongoing collaboration and capacity-building programs, we can support suppliers in adopting sustainable practices, leading to a more socially and environmentally responsible supply chain." (Corporate Social Responsibility Officer, 2023).*

*"Supplier engagement and partnerships are integral to ensuring quality, safety, and sustainability in our manufacturing processes. By working closely with our suppliers, we can ensure the consistent supply of high-quality raw materials, foster innovation, and drive responsible manufacturing practices throughout the value chain." (Operations Manager, 2023).*

*"Building strong partnerships with suppliers is key to ensuring responsible sourcing practices. By conducting regular audits, providing training, and establishing long-term relationships based on trust and transparency, we can enhance supplier capabilities and jointly work towards a sustainable and ethical supply chain." (Sustainable Sourcing Manager, 2023).*

*"Supplier engagement is vital for maintaining product quality and safety. By working closely with our suppliers, we can ensure adherence to quality standards, monitor raw material integrity, and implement effective traceability systems, ultimately providing safe and reliable products to consumers." (Quality Assurance Officer, 2023).*

Qualitative revealed that, socially inclusive practices were also undertaken by pharmaceutical companies since they operate within communities like the Tema industrial areas, North Industrial areas and other isolated areas and communities in Ghana. Various statements were made to support the adoption of socially inclusive practices:

*"Socially inclusive practices are at the heart of our commitment to the community. By actively engaging with local stakeholders, investing in education and healthcare initiatives, and prioritizing employment opportunities for marginalized groups, we strive to create a positive and sustainable impact." (Corporate Social Responsibility Manager, 2023).*

*"A socially inclusive approach is essential for the pharmaceutical industry to address the unique healthcare needs of the community. By collaborating with local healthcare providers, NGOs, and community leaders, we can develop targeted healthcare programs, increase access to medicines, and improve health outcomes for underserved populations." (Medical Director, 2023).*

*"Socially inclusive practices in the pharmaceutical industry are not only a moral imperative but also a strategic advantage. By embracing diversity, promoting gender equality, and fostering an inclusive work environment, we can harness the unique talents and perspectives of our workforce, drive innovation, and better meet the healthcare needs of the diverse communities we serve." (Human Resources Manager, 2023).*

*"Promoting social inclusivity requires us to go beyond business objectives and prioritize the needs of vulnerable populations. By investing in healthcare infrastructure in underserved areas, providing access to essential medicines, and implementing health education programs, pharmaceutical companies can play a transformative role in improving health outcomes and reducing health disparities." (Medical Outreach Coordinator, 2023).*

### **5.2.2 Role of the upstream pharmaceutical policy framework of Ghana on supply chain sustainability.**

The main objectives of Ghana's pharmaceutical policy were universal access to critical medications, quality control of all drugs sold, a functional and effective supply chain, and responsible patient and professional use of medications. Interviews revealed that some key institutions in Ghana were mandated by policy on pharmaceutical industry to play important roles. Some of the roles are summarized in Table 5.2 below.

**Table 5. 2 Institutions for Policy Framework**

<b>Policy/Institutions</b>	<b>Description</b>
National Medicines Policy	The National Medicines Policy of Ghana serves as a guiding framework for the pharmaceutical sector. It aims to ensure the availability, accessibility, affordability, and quality of essential medicines to all citizens. The policy emphasizes the importance of rational use of medicines, local production capacity, and the regulation of pharmaceutical products.
Ghana Food and Drugs Authority (FDA)	<p>The FDA is the regulatory body responsible for the oversight and control of pharmaceuticals in Ghana. It is responsible for the registration, regulation, and post-market surveillance of pharmaceutical products to ensure their safety, quality, and efficacy. The FDA plays a critical role in enforcing pharmaceutical regulations and promoting good manufacturing practices within the industry.</p> <p>The Ghana FDA enforces GMP regulations to ensure that pharmaceutical manufacturing facilities adhere to quality standards. This includes guidelines for the design, construction, and operation of facilities, as well as the processes and controls necessary for the production of safe and effective pharmaceutical products.</p> <p>Pharmacovigilance is an essential component of the pharmaceutical policy framework in Ghana. The FDA and other relevant stakeholders work to monitor the safety of pharmaceutical products, collect and analyse adverse event reports, and take necessary actions to protect public health.</p>
Local Pharmaceutical Manufacturing	The Ghanaian government has shown commitment to promoting local pharmaceutical manufacturing as part of its upstream pharmaceutical policy. This includes providing support and incentives to local manufacturers, encouraging technology transfer, and promoting investments in research and development to enhance local production capacity.
Intellectual Property Rights (IPR)	<p>Ghana has established laws and regulations to protect intellectual property rights in the pharmaceutical sector. This includes patent protection for innovative pharmaceutical products, ensuring fair market competition, and promoting innovation and investment in the industry.</p> <p>Intellectual property laws in Ghana include Protection Against Unfair Competition Act, 2000 (Act 589); the Industrial Designs Act, 2003 (Act 660); the Patents Act, 2003 (Act 657); the Trademarks Act, 2004 (Act 664); Copyright Act, 2005 (Act 690).</p>

Source: Author 2023

The pharmaceutical policy framework of Ghana plays a crucial role in influencing and impacting the sustainability of the pharmaceutical supply chain. The section presents some the channels in which the policy framework affects the sustainability of the supply chain.

- **Local Manufacturing and Sourcing**

The policy framework's emphasis on promoting local pharmaceutical manufacturing can contribute to supply chain sustainability. By supporting local production, the framework reduces reliance on imports, which can minimize transportation-related emissions and logistical challenges. Local manufacturing also has the potential to create employment opportunities, support economic growth, and enhance the resilience of the supply chain.

*"Investing in local manufacturing and sourcing is not only crucial for reducing our dependency on imports but also for building a sustainable pharmaceutical industry in Ghana. By producing medicines locally, we can create jobs, contribute to the economy, and ensure a stable supply chain that meets the healthcare needs of our population." (CEO, 2023).*

*"Local manufacturing and sourcing allow us to have greater control over the quality and availability of essential medicines. By producing locally, we can respond more efficiently to market demands, minimize supply chain disruptions, and improve access to affordable, high-quality medications for our fellow Ghanaians." (Production Manager, 2023).*

*"Supporting local manufacturing and sourcing is not only a business decision; it is a commitment to the development and well-being of our nation. By partnering with local suppliers and manufacturers, we can promote economic growth, foster innovation, and ensure the availability of safe and effective medicines for all Ghanaians." (Procurement Manager, 2023).*

*"Local manufacturing and sourcing align with our sustainability goals. By reducing our carbon footprint through shorter supply chains, supporting local communities, and investing in local talent and resources, we can contribute to a greener future while meeting the healthcare needs of Ghana's population." (Manager, 2023).*

*"Local manufacturing and sourcing strengthen our ability to respond to public health emergencies and ensure the availability of critical medicines in times of crisis. By developing*

*a resilient local supply chain, we can address supply disruptions, maintain drug security, and safeguard the health of our citizens." (Medical Director, 2023).*

- **Quality Assurance and Good Manufacturing Practices**

The policy framework's focus on enforcing quality assurance and GMP ensures that pharmaceutical products meet specified standards of safety, efficacy, and quality. Adhering to GMP guidelines helps minimize product recalls, waste, and the risk of substandard or counterfeit medicines entering the supply chain. This contributes to sustainability by reducing the environmental and economic impact of poor-quality or unsafe products. Some of the participants noted;

*"Ensuring stringent quality assurance and adhering to good manufacturing practices are paramount in our operations. By upholding high standards of quality and safety throughout the manufacturing process, we can instill confidence in our products and protect the health and well-being of our consumers." (Quality Assurance Manager, 2023).*

*"Adhering to good manufacturing practices is not just a regulatory requirement; it is a responsibility we owe to our patients. By maintaining strict control over our manufacturing processes, ensuring proper documentation, and implementing comprehensive quality management systems, we can safeguard the integrity and efficacy of our medicines." (Production Supervisor, 2023).*

*"Quality assurance is at the core of our operations. By investing in state-of-the-art laboratory facilities, employing highly skilled quality control personnel, and conducting rigorous testing and analysis, we can guarantee the safety, purity, and potency of our pharmaceutical products." (Quality Control Manager, 2023).*

*"Good manufacturing practices are the backbone of our industry. By following established guidelines, continuously training our staff, and implementing quality improvement initiatives, we can continuously enhance our manufacturing processes, reduce errors, and ensure the consistent delivery of safe and effective medicines." (Operations Manager, 2023).*

- **Regulatory Compliance**

The pharmaceutical policy framework, enforced by the Ghana Food and Drugs Authority (FDA), establishes regulations and standards for the industry. Compliance with these regulations, including licensing, product registration, and post-market surveillance, ensures that pharmaceutical companies operate responsibly and ethically. This helps maintain the integrity of the supply chain, fosters transparency, and promotes accountability among industry stakeholders. Some of the participants stated;

*"Regulatory compliance is the cornerstone of our operations. By strictly adhering to the regulations set forth by the Ghana Food and Drugs Authority (FDA) and other relevant authorities, we ensure that our products meet the highest standards of safety, efficacy, and quality, instilling trust in both healthcare professionals and patients." (Regulatory Affairs Manager, 2023)*

*"Compliance with regulatory requirements is not only a legal obligation but also a commitment to patient safety. By maintaining robust documentation, conducting regular audits, and staying updated on evolving regulations, we can demonstrate our dedication to delivering pharmaceutical products that meet the highest standards of quality and efficacy." (Compliance Officer, 2023).*

*"Regulatory compliance is the foundation of our ethical business practices. By operating in full compliance with all applicable laws and regulations, we protect the integrity of the pharmaceutical industry, ensure fair competition, and contribute to the overall health and well-being of the Ghanaian population." (CEO, 2023).*

*"Adherence to regulatory compliance is essential for maintaining market access and protecting public health. By diligently following the guidelines and requirements set forth by regulatory authorities, we demonstrate our commitment to safety, efficacy, and quality, fostering confidence in our products among healthcare professionals and patients." (Quality Assurance and Regulatory Affairs Manager, 2023).*

*"Regulatory compliance is a non-negotiable aspect of our business. By closely collaborating with regulatory authorities, conducting internal audits, and staying up to date with regulatory changes, we ensure that our operations are aligned with the latest guidelines and requirements,*

*enabling us to bring safe and effective medicines to the Ghanaian market." (Head of Regulatory Compliance, 2023).*

- **Intellectual Property Rights (IPR)**

The framework's protection of intellectual property rights in the pharmaceutical sector encourages innovation, research, and development. By safeguarding the rights of pharmaceutical companies to their innovations, the policy framework incentivizes investment in sustainable practices and the development of new technologies, products, and manufacturing processes that can enhance supply chain sustainability. Regarding IPR, participants had this to say;

*"Respecting intellectual property rights is not only a legal obligation but also an ethical responsibility. By honouring patents and copyrights, we encourage fair competition, reward innovation, and ensure a level playing field for all pharmaceutical companies in Ghana, ultimately driving the growth and sustainability of the industry." (Legal Counsel, 2023).*

*"Intellectual property rights protection promotes technology transfer and knowledge sharing. By providing a framework that safeguards the rights of innovators and creators, we encourage collaboration, foster partnerships, and facilitate the transfer of advanced manufacturing processes and expertise, strengthening the local pharmaceutical industry in Ghana." (Director of Technology Transfer, 2023).*

*"Intellectual property rights play a critical role in attracting foreign direct investment to the pharmaceutical sector in Ghana. By providing a secure and enforceable legal framework for the protection of intellectual property, we create an environment that encourages international companies to bring their expertise, resources, and technologies, contributing to the growth and competitiveness of the industry." (Business Development Manager, 2023).*

*"Respecting intellectual property rights is vital for ensuring a sustainable and vibrant pharmaceutical industry in Ghana. By safeguarding the rights of innovators, we foster an environment that rewards creativity, stimulates innovation, and ultimately leads to the development of new and improved medicines that address the healthcare needs of our population." (CEO, 2023).*

### 5.3 Quantitative Results

The quantitative aspect of the study provided answers to objectives 3 and 4 of the study. Both descriptive information on the respondents and variables are presented. Again, structural equations modeling technique was deployed to estimate the relation that exist among variables in this study.

#### 5.3.1 Respondents' Descriptive statistics

Under the quantitative aspect of the study, 334 respondents were surveyed within the upstream pharmaceutical industry of Ghana. The descriptive information covered gender, experience level of respondents within the upstream pharmaceutical industry captured in years, and finally their respective positions. A summary of the information is presented in Table 5.3.

*Table 5. 3 Respondents Demographic Information*

		Frequency	Percent	Cumulative Percent	Mean	Std. Deviation
Gender	Male	207	62	62	9.07	7.563
	Female	127	38	100		
Experience	2	17	5.1	5.1		
	3	48	14.4	19.5		
	4	51	15.3	34.7		
	5	59	17.7	52.4		
	6	12	3.6	56		
	8	21	6.3	62.3		
	9	7	2.1	64.4		
	10	14	4.2	68.6		
	11	7	2.1	70.7		
	12	7	2.1	72.8		
	13	14	4.2	76.9		
	14	7	2.1	79		
	15	21	6.3	85.3		
	17	7	2.1	87.4		
	18	7	2.1	89.5		
	19	7	2.1	91.6		
	21	7	2.1	93.7		
22	7	2.1	95.8			
30	7	2.1	97.9			
38	7	2.1	100			
Position	Director	15	4.5	4.5		
	Supply Chain Manager	96	28.7	33.2		

	Frequency	Percent	Cumulative Percent	Mean	Std. Deviation
Procurement Manager	88	26.3	59.6		
Logistics Manager	61	18.3	77.8		
Others	74	22.2	100		
Total	334	100			

### 5.3.2 Descriptive statistics for variables

The focus of the quantitative analysis was to provide answers to objective 3 (To examine how upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana), and objective 4 (To examine the role of top management in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana). Using the structural equation modeling technique, the results are presented below Table 5. 4 depicts the Variables Descriptive Information for quantitative data.

Table 5. 4 Descriptive Information for quantitative data.

Variables		Mean	Median	Standard deviation	Grand Mean	Overall Standard Dev.
Operational Practices (OP)	SSCM1	4.02	3.98	1.04	4.03	1.03
	SSCM2	3.96	3.92	1.01		
	SSCM3	4.06	4.07	1.01		
	SSCM4	4.04	4.04	1.10		
	SSCM5	4.06	4.07	1.01		
Supply Chain Integration (SCI)	SSCM6	4.05	4.00	1.01	3.99	0.99
	SSCM7	4.01	3.96	0.96		
	SSCM8	4.00	3.98	1.01		
	SSCM9	3.89	3.92	0.99		
	SSCM10	3.98	3.93	1.03		
Environmental Management Practices (EMP)	SSCM11	4.00	4.01	1.00	3.98	1.01
	SSCM12	4.01	4.00	1.00		
	SSCM13	3.91	3.94	1.01		
	SSCM14	3.90	3.95	1.01		
	SSCM15	3.99	4.06	0.98		
	SSCM16	4.09	4.09	1.03		
Socially Inclusive Practices for Employees (SIPE)	SSCM17	4.00	4.02	0.98	4.00	1.00
	SSCM18	4.00	4.08	0.97		
	SSCM19	4.03	4.04	0.99		
	SSCM20	3.99	3.96	0.99		

<b>Variables</b>		<b>Mean</b>	<b>Median</b>	<b>Standard deviation</b>	<b>Grand Mean</b>	<b>Overall Standard Dev.</b>
Socially Inclusive Practices for Community (SIPC)	SSCM21	3.99	3.98	1.04		
	SSCM22	4.05	4.00	1.00	4.01	1.02
	SSCM23	3.98	3.97	1.00		
Environmental performance (EPR)	EPR1	4.03	4.04	0.95		
	EPR2	3.97	3.93	0.98	4.01	0.99
	EPR3	4.03	4.01	1.03		
Operations performance (OPR)	OPR1	4.00	4.07	1.05		
	OPR2	4.05	4.02	0.99	4.01	0.99
	OPR3	3.98	4.06	0.91		
Community-centered social performance (CSP)	CSP1	4.02	4.08	0.99		
	CSP2	3.90	3.85	1.02	3.97	0.99
	CSP3	3.98	3.98	0.96		
Top Management Commitment (TMC)	TMC1	4.00	3.94	0.99		
	TMC2	4.01	3.98	1.02		
	TMC3	4.09	4.15	0.95		
	TMC4	3.96	4.00	0.98	4.01	0.99
	TMC5	3.98	3.98	0.98		
	TMC6	3.97	4.01	1.01		
	TMC7	3.97	3.92	0.96		
	TMC8	4.09	4.09	0.98		
	TMC9	4.05	4.04	1.02		

The interpretation of the Likert scale is guided by studies from Douven 2018) and dVogel, Koutsombogera & Costello 2020). A mean score of 4 or above denotes employee agreement with the assertions, suggesting that the pharmaceutical firm has adopted SSCM), top management commitment, and SSCMP. A mean score of between 3 and 4 shows that respondents were more evenly split between leaning toward agreement with the statement and neutrality. Employees were more likely to disagree with the assertions if they score between 3 and 2. Scores of less than 2 indicated disagreement with assertions and suggested that the pharmaceutical business does not use the aspect. Despite the fact that the elements may be used, the strategy may be flawed or completely ineffective, and the elements may have no effect at all. This goal was to determine if respondents believed the components were in place at their pharmaceutical firm. An explanation of each specific sustainable supply chain management approach is given in the section that follows.

- **Operational Practices (OP)**

To gauge how much their organization adheres to operational practices (OP), respondents were asked to rate their degree of agreement. The statements focused on how the company supported its suppliers in implementing quality improvement methodologies such as TQM, Six Sigma, TPM, and TQC to ensure high-quality products. Also, how the company assisted suppliers in implementing Value Engineering techniques to reduce component costs. In their production environment, how the company adheres to the principles of Just-in-time and scientific inventory control to maintain optimal inventory levels. Additionally, the statement focused on how the companies have adopted lean production practices to minimize waste throughout their operations. OP as measured with statements denoted as SSCM1, SSCM2, SSCM3, SSCM4, and SSCM5 had an overall mean score of 4.03 with a standard deviation of 1.03. Statements SSCM3 and SSCM5 which were “We follow Just-in-time/Scientific inventory control technique consistently to keep inventory under control in the production environment” and “We attempt to achieve economies of scale in inbound and or outbound transportation” both had mean and standard deviations of 4.06 and 1.01 respectively. This finding implies that respondents tend to agree that they are deploying scientific inventory controls and robust inbound and outbound transportation for their operations within the pharmaceutical industry.

- **Supply Chain Integration (SCI)**

The second indicator variable for sustainable supply chain management was SCI. Statements that were made focused on how the company was responsive to customer needs and adjusts its production plan, accordingly, prioritize timely communication and collaboration with suppliers, sharing updated production plans based on customer requirements. Again, statements on realistic assessment of customers' future needs and to ensure that this information was promptly conveyed to suppliers were advanced. SSCM6 which had the statement “We update our production plan as per the changing needs of customers and share the same with suppliers” had a strong agreement with mean of 4.05 and standard deviation of 1.01. The overall mean was 3.99 and standard deviation was 0.99. Even the lowest mean score supporting supply chain integration was SSCM9 which statement was “We communicate customers’ future needs to the suppliers quickly”. Thus, the SSCM9 mean was 3.89 with standard deviation of 0.99. This implies that respondents are more evenly split between leaning toward agreement with the statement and neutrality. Simply, there is somewhat agreement that the companies deploy communication that ensures that customers future needs are communicated to the suppliers.

- **Environmental Management Practices (EMP)**

EMP was another variable and or proxy for sustainable supply chain management used in this study. Statements that were made focused on pharmaceutical companies prioritizing timely communication of customers' future needs to suppliers, implementing Environmental Management Systems (EMS) in their organization, such as ISO 14001 certification or equivalent, to address environmental concerns. Other statements included providing design specifications to suppliers that include environmental compliance for purchased items, and their suppliers are also credited with ISO 14001 certification or a comparable EMS, focusing on eco-friendly design and distribution of products to address environmental concerns raised by their customers. They adopt cleaner production practices and have successfully designed products that consume reduced amounts of input materials and energy. Furthermore, the organization has advanced safety measures in place, which effectively reduce the risk of accidents. The statement with the highest mean score was SSCM16 (Mean=4.09, SD=1.03). The overall mean score was 3.98 with standard deviation of 1.01. This implies that respondents somewhat agreed to the use of environmental management practices, thus leaning towards agreeing and neutrality.

- **Socially Inclusive Practices for Employees (SPE)**

The focus of this section was on SPE as one of the proxies of sustainable supply chain management. Respondents were asked to state their level of agreement with the following statements: Our organization prioritizes the well-being of its employees by fostering a healthy and positive working environment. We strictly prohibit the use of child labor and forced labor within our organization. We ensure that the wages and benefits provided to our employees are adequate to meet their basic needs. Additionally, our employees are entitled to various benefits such as a leave provident fund, medical benefits, and other facilities to support their overall well-being. Highest individual mean score for the statement was SSCM19 (Mean=4.03, SD=0.99) that is “The wages and perquisites given out to the employees are sufficient to meet their basic needs in our organization”. The statement mean score recorded was on SSCM20 which states that “Our employees are entitled to leave, provident fund, medical benefits and other facilities”. The means score for SSCM20 was 3.99 with standard deviation of 0.99. This implies that respondents were leaning between agreement and neutrality to the use of leave, provident fund, and medical benefits as efforts to drive SPE. But overall, the mean score for

SPE was 4.00 with a standard deviation of 1.00. This generally implies that there is agreement to the implementation of SPE at pharmaceutical companies in Ghana.

- **Socially inclusive practices for Community (SPC)**

SPC were measured using statements such as “We provide employment/business opportunities to the surrounding community”, “We provide health care facilities to the local community”, and “We provide primary education facilities to the surrounding people”. The overall mean score for SPC was 4.01 with a standard deviation of 1.02. The general implication is that respondents agreed that SPC are implemented within the pharmaceutical industry.

- **Sustainable Supply Chain Management Performance (SSCMP)**

Sustainable supply chain management performance was measured using three indicator variables Environmental performance (EPR), Operations performance (OPR), and Community-centered social performance (CSP). Respondents were asked to state their level of agreement and disagreement with the statements. Environmental performance (EPR) had an overall mean score of 4.01 with a standard deviation of 0.99. Both EPR1 and EPR3 which statements were “SSCM measures have reduced the cost of effluent treatment and effluent discharge” and “SSCM measures have reduced the frequency of environmental accident” respectively had means 4.03 with different standard deviations as 0.95 and 1.03 respectively. OPR also had overall mean and standard deviation as 4.01 and 0.99 respectively. This implied that respondents agree that the pharmaceutical companies are attaining higher sustainable operational performance. On the level of specific statements, OPR2 which statement was “SSCM measures have improved the efficiency of inbound logistics” had the highest mean score of 4.05 and a standard deviation of 0.99. The lowest mean score was 3.98 for OPR3 for which statement was “SSCM measures have improved the efficiency of outbound logistics”.

Statements on Community-centered social performance (CSP) as an indicator for sustainable supply chain management performance were “SSCM measures have improved the opportunities of the surrounding community in respect of employment/business”, “SSCM measures have improved the literacy/level of education of the surrounding people”, and “The proportion of time the surrounding people remain productive and free from ailments has increased due to health care facilities”. The overall mean score and standard deviation were 3.97 and 0.99 respectively. This implies that respondents agree and are neutral to the pharmaceutical companies attaining CSP.

- **Top Management Commitment (TMC)**

TMC was also measured. The statements of interest in this study included Top management plays a crucial role in emphasizing and prioritizing SSCM as a key strategic direction for the company. They lead by example, setting the standards for SSCM within the organization. They closely supervise all activities related to the management of key accounts and willingly invest significant time and effort to contribute to the achievement of SSCM goals. Top management consistently emphasizes the importance of all units working together to deliver value to key customers. They allocate the necessary resources, including financial, time, and personnel, to support SSCM practices. Furthermore, they systematically monitor and actively participate in the design and implementation of SSCM functions. Top management also acknowledges and rewards actions and initiatives that contribute to the development of SSCM within the company. The overall mean score was 4.01 and a standard deviation was 0.99. This implies that respondents agree that top management commitment is important to realizing pharmaceutical company performance objectives. Particularly, the implementation of sustainable supply chain management practices requires top management to be committed. Statement TMC8, “Top management actively participates in the designing SSCM functions” had the highest mean score of 4.09 and a standard deviation of 0.98. The lowest mean score was 3.96 for TMC4, that is “Top management has no hesitation to spend a lot of time to contribute to the attainment of SSCM” implying that respondents lean towards agreement and neutrality. But as has been found from the overall mean, top management commitment has been agreed to play an important role in ensuring implementation of sustainable supply chain management and performance in general.

### **5.3.3 Normality Test**

A normality test is a statistical test used to assess whether a given dataset follows a normal distribution. The normal distribution, also known as the Gaussian distribution or bell curve, is a common assumption in many statistical methods. The purpose of a normality test is to determine if the data can be reasonably modeled by a normal distribution or if it significantly deviates from it (Bayoud 2021; Cangur & Ercan, 2015). Table 5. 5 presents the Test of Normality below:

Table 5. 5 Test of Normality

Variables		Standard						
		Mean	Median	deviation	Min	Max	Skewness	Kurtosis
	SSCM1	4.02	3.98	1.04	1	5	0.034	-0.305
Operational	SSCM2	3.96	3.92	1.01	1	5	-0.062	0.084
Practices (OP)	SSCM3	4.06	4.07	1.01	1	7	0.124	-0.006
	SSCM4	4.04	4.04	1.10	1	7	0.033	0.576
	SSCM5	4.06	4.07	1.01	1	7	0.167	0.009
Supply Chain	SSCM6	4.05	4.00	1.01	1	7	0.120	-0.074
Integration (SCI)	SSCM7	4.01	3.96	0.96	1	7	-0.109	0.013
	SSCM8	4.00	3.98	1.01	1	7	-0.011	-0.322
	SSCM9	3.89	3.92	0.99	1	7	0.055	-0.131
	SSCM10	3.98	3.93	1.03	1	7	0.288	0.020
Environmental	SSCM11	4.00	4.01	1.00	1	7	-0.091	-0.373
Management	SSCM12	4.01	4.00	1.00	1	7	0.106	0.060
Practices (EMP)	SSCM13	3.91	3.94	1.01	1	7	-0.042	0.119
	SSCM14	3.90	3.95	1.01	1	7	-0.129	0.690
	SSCM15	3.99	4.06	0.98	1	7	-0.497	1.162
	SSCM16	4.09	4.09	1.03	1	7	-0.041	-0.385
Socially	SSCM17	4.00	4.02	0.98	1	7	0.077	-0.299
Inclusive	SSCM18	4.00	4.08	0.97	1	7	-0.081	-0.337
Practices for	SSCM19	4.03	4.04	0.99	1	7	-0.218	0.026
Employees								
(SIPE)	SSCM20	3.99	3.96	0.99	1	7	0.047	0.000
Socially	SSCM21	3.99	3.98	1.04	1	7	-0.030	0.046
Inclusive								
Practices for								
Community								
(SIPC)	SSCM22	4.05	4.00	1.00	1	7	-0.020	0.029
	SSCM23	3.98	3.97	1.00	1	7	-0.082	0.000
Environmental	EPR1	4.03	4.04	0.95	1	7	-0.040	-0.116
performance								
(EPR)	EPR2	3.97	3.93	0.98	1	7	0.059	-0.127
	EPR3	4.03	4.01	1.03	1	7	0.100	0.071
Operations	OPR1	4.00	4.07	1.05	1	7	-0.169	0.607
performance								
(OPR)	OPR2	4.05	4.02	0.99	1	7	0.106	-0.552
	OPR3	3.98	4.06	0.91	1	7	-0.258	0.173
	CSP1	4.02	4.08	0.99	1	7	-0.055	-0.494

Variables		Mean	Median	Standard	Min	Max	Skewness	Kurtosis
				deviation				
Community-centered social performance (CSP)	CSP2	3.90	3.85	1.02	1	7	0.090	-0.254
	CSP3	3.98	3.98	0.96	1	7	0.191	0.411
	TMC1	4.00	3.94	0.99	1	7	0.064	-0.189
	TMC2	4.01	3.98	1.02	1	7	0.165	-0.137
Top Management Commitment (TMC)	TMC3	4.09	4.15	0.95	1	7	-0.069	0.121
	TMC4	3.96	4.00	0.98	1	7	-0.244	0.356
	TMC5	3.98	3.98	0.98	1	7	0.165	0.211
	TMC6	3.97	4.01	1.01	1	7	-0.065	-0.194
	TMC7	3.97	3.92	0.96	1	7	0.136	-0.187
	TMC8	4.09	4.09	0.98	1	7	0.039	-0.453
	TMC9	4.05	4.04	1.02	1	7	0.039	0.103

Skewness and kurtosis should be between -2 and +2 and -7 and +7, respectively, as a general guideline for testing normality (Bayoud, 2021; Kwak & Park, 2019; Blanca, Arnau, López-Montiel, Bono & Bendayan, 2013). As can be observed from Table 5.4, both the skewness and kurtosis calculated in this study were within the typical range for achieving normalcy.

Based on the criteria advanced by Kline (2016), the absolute value of the individual indicators should not be greater than 3 (Klein 2016). The only instance where normality distribution is violated is when the absolute score of skewness of the individual indicators is greater than 3. The Operational Practices (OP) (that is, SSCM1 to SSCM5) had skewness coefficients less than 3. The highest skewness coefficient for Operational Practices (SSCM5) is 0.167. This absolute value is less than the minimum value required for normality as advanced by Kline (2016). In the same manner, the highest absolute value of skewness for Supply Chain Integration (SSCM6) is 0.120, that of Environmental Management Practices (SSCM10) is 0.288, that of Socially Inclusive Practices for Employees (SSCM19) is 0.218, Socially Inclusive Practices for Community (Sscm23) is 0.082, Environmental performance (EPR2) had 0.100, Operations performance (OPR3) had 0.258, Community-centered social performance (CSP3) had 0.191, and Top Management Commitment (TMC) had 0.165.

### 5.3.4 Reliability and validity of the constructs

A summary of the study instrument's validity and reliability is discussed in the section. Composite reliability scores (CR) and Cronbach's alpha from a reliability were discussed. The validity of both convergent and discriminating claims were evaluated. The factor loadings, significance levels, and AVE scores were explored in terms of convergent validity. The correlation scores and AVEs were examined from the standpoint of discriminant validity. Table 5. 5 showcase the Reliability and Validity Measures adopted in the study:

*Table 5. 6 Reliability and Validity Measures*

	<b>Code</b>	<b>Factor Loading (<math>\lambda</math>)</b>	<b>z-value</b>	<b>p</b>	<b>Cronbach's Alpha</b>	<b>CR</b>	<b>AVE</b>	<b>Final numbers of items and (Initials)</b>
OP	SSCM1	0.864	21.53	< .001	0.940	0.941	0.800	4(5)
	SSCM2	0.891	20.772	< .001				
	SSCM3	0.795	21.025	< .001				
	SSCM5	0.794	19.89	< .001				
SCI	SSCM8	0.849	18.083	< .001	0.889	0.890	0.802	2(5)
	SSCM9	0.937	22.376	< .001				
EMP	SSCM10	0.935	19.317	< .001	0.916	0.905	0.624	6(7)
	SSCM11	0.887	15.282	< .001				
	SSCM12	0.744	18.048	< .001				
	SSCM13	0.797	16.594	< .001				
	SSCM14	0.818	18.183	< .001				
	SSCM15	0.748	16.658	< .001				
SIPE	SSCM17	0.725	12.605	< .001	0.835	0.852	0.659	3(4)
	SSCM18	0.893	20.703	< .001				
	SSCM20	0.735	20.984	< .001				
SIPC	SSCM21	0.819	20.268	< .001	0.883	0.886	0.722	3(3)
	SSCM22	0.836	19.444	< .001				
	SSCM23	0.718	16.076	< .001				
SSCMP	EPR1	0.830	17.993	< .001	0.922	0.929	0.771	6(9)
	EPR2	0.947	24.102	< .001				
	OPR1	0.937	23.301	< .001				
	OPR2	0.794	15.496	< .001				
	CSP1	0.807	15.955	< .001				

	Code	Factor Loading ( $\lambda$ )	z-value	p	Cronbach's Alpha	CR	AVE	Final numbers of items and (Initials)
	CSP2	0.815	14.097	< .001				
TMC	TMC1	0.735	15.185	< .001	0.899	0.899	0.600	6(9)
	TMC2	0.709	13.266	< .001				
	TMC6	0.779	16.704	< .001				
	TMC7	0.822	18.827	< .001				
	TMC8	0.825	17.67	< .001				

Cronbach's alpha is a widely used statistical measure of internal consistency reliability in research and psychometrics. It assesses the extent to which the items in a scale or a set of measures are interrelated and measure the same underlying construct (Ahmad, Zulkurnain & Khairushalimi, 2016; Bonett & Wright, 2015). Cronbach's alpha is calculated by examining the average correlation among the items in a scale and the variance of the scale. It is based on the assumption that the items in the scale are intended to measure the same construct and should be highly correlated with each other. Cronbach's alpha ranges from 0 to 1, with higher values indicating greater internal consistency reliability. Generally, a Cronbach's alpha value of 0.70 or higher is considered acceptable, indicating a reliable scale (Dash & Paul, 2021; Hair et al., 2017). However, the specific threshold for acceptable reliability may vary depending on the field of study and the context of the research. Researchers use Cronbach's alpha to assess the extent to which the items in a scale are measuring the same construct consistently. A higher Cronbach's alpha suggests that the items are interrelated and provide a reliable measure of the underlying construct. Conversely, a lower Cronbach's alpha may indicate that the items are not strongly related or are measuring different aspects of the construct. From the data, Socially Inclusive Practices for Employees (SIPE) had the lowest Cronbach's alpha ( $\alpha=0.835$ ) which is even above the minimum threshold of 0.7.

The reliability of the factors of Operational Practices (OP) was  $\alpha=0.940$ , Supply Chain Integration (SCI) was  $\alpha=0.889$ , Environmental Management Practices (EMP) was  $\alpha=0.916$ , that of Socially Inclusive Practices for Employees (SIPE) was  $\alpha=0.835$ , Socially Inclusive Practices for Community (SIPC) had  $\alpha=0.883$ , that of SSCMP was  $\alpha=0.922$ , and finally Top Management Commitment (TMC) had  $\alpha=0.899$ . All the other variables used in this study had Cronbach's alpha greater than the minimum required threshold. Simply, the estimated

Cronbach's alpha demonstrated that the items are interrelated and provide a reliable measure of the underlying construct.

#### **5.3.4.1 Convergent and Discriminatory Validity**

The measuring model's convergent and discriminatory validity were evaluated. Due to the fact that highly reliable scales typically exhibit convergent validity, convergent validity refers to the extent to which the numerous items share a significant amount of variation (Afthanorhan, Ghazali & Rashid, 2021; Ab Hamid, Sami & Mohmad Sidek, 2017; Henseler, Ringle & Sarstedt, 2015). Utilizing composite reliability (CR), average extracted variance (AVE), and standardized factor loadings, the convergent validity of the measurement model was evaluated.

In statistics and factor analysis, "factor loading" refers to the correlation between a specific variable and a latent factor (Liang, 2020; Sass, 2010). It indicates how strongly a variable is associated with a particular factor in the factor analysis. For interpretation, a factor loading close to 1 (positive or negative) indicates a strong relationship between the variable and the factor. It suggests that the variable is a good indicator or representative of the underlying factor. A factor loading close to 0 suggests a weak or negligible relationship between the variable and the factor. It implies that the variable does not contribute much to explaining the underlying factor. A positive factor loading indicates a positive relationship between the variable and the factor, meaning that as the variable increases, so does the factor. A negative factor loading indicates a negative relationship between the variable and the factor, meaning that as the variable increases, the factor decreases. Factor loadings are typically represented as coefficients ranging from -1 to 1, with values closer to 0 indicating weaker associations and values closer to -1 or 1 indicating stronger associations (Dash & Paul, 2021; Sass, 2010). Interpreting factor loadings requires context and understanding of the specific analysis being performed. Factor analysis is used to identify underlying dimensions or factors that explain the patterns of correlations among a set of variables. The factor loadings help determine which variables are most strongly related to each factor and contribute the most to its interpretation (Dash & Paul, 2021). It is important to note that factor loadings are specific to the dataset and analysis at hand, and different factors may emerge depending on the variables included or the sample being studied. In Table 5.5 above, it can be seen that the lowest factor loading estimated was 0.709 for TMC2. This indicates a strong relation to top management commitment. The highest loading is EPR2 ( $\lambda=0.947$ ). Overall, the individual indicators provided a strong relation to their respective factors.

Composite reliability (CR) is a statistical measure used to assess the internal consistency or reliability of a latent construct or a composite score in a research study. It is commonly employed in structural equation modeling (SEM) and confirmatory factor analysis (CFA) to evaluate the reliability of measurement scales. CR is calculated by considering the factor loadings and the variances of the observed variables (indicators) that form a latent construct. It is an indicator of how well the observed variables collectively represent the latent construct. The CR value ranges from 0 to 1, where higher values indicate greater internal consistency. Typically, a CR value of 0.70 or higher is considered acceptable, while values above 0.80 are considered good. However, the specific threshold for acceptable reliability may vary depending on the field of study and the context of the research. Researchers use CR to determine whether the observed variables adequately measure the latent construct. Higher CR values indicate that the observed variables are highly reliable and provide a good representation of the construct. Lower CR values suggest that the observed variables may not be consistently measuring the construct, and further refinement or modification of the measurement scale may be necessary. The lowest CR in this study was 0.852 for SIPE. Simply, the estimated CR in this study demonstrated how well the observed variables collectively represent the latent construct.

AVE is a statistical measure used in SEM and confirmatory CFA to assess the convergent validity of a latent construct or a measurement scale. AVE represents the proportion of variance in the observed variables that is captured by the latent construct. AVE is calculated by examining the factor loadings and the variances of the observed variables that form a latent construct. It provides an estimate of how much of the variation in the observed variables is due to the underlying construct, rather than measurement error or other factors. The AVE value ranges from 0 to 1, where higher values indicate greater convergent validity. Generally, an AVE value of 0.50 or higher is considered acceptable, indicating that the construct explains at least 50% of the variance in the observed variables. However, the specific threshold for acceptable convergent validity may vary depending on the field of study and the context of the research. Researchers use AVE to determine whether the observed variables adequately reflect the underlying construct and share sufficient common variance. Higher AVE values indicate that the observed variables are converging on a common underlying construct, supporting the convergent validity of the measurement scale. Lower AVE values may suggest that the observed variables are not capturing enough shared variance and further refinement of the measurement scale is needed. Estimated AVE for TMC was 0.600 which was above the

minimum threshold of 0.5. This implies that that the construct explains at least 60% of the variance in the observed variable.

The degree to which scales do not correlate with one another, or how distinctive and different a scale is, is referred to as discriminant validity (Ab Hamid et al., 2017). The Heterotrait-Monotrait (HTMT) ratio of correlations is a statistical measure used to assess discriminant validity in multi-trait multi-method (MTMM) studies. It helps researchers evaluate whether the correlations between different traits (heterotraits) are lower than the correlations between the same traits (monotraits) (Afthanorhan et al., 2021; Roemer, Schubert & Henseler, 2021; Ab Hamid et al., 2017). HTMT (Heterotrait-Monotrait Ratio of Correlations) is a criterion for assessing discriminant validity, which is the extent to which constructs that are expected to be different are actually different. Here are the criteria for HTMT: HTMT ratio of two constructs should be less than 0.85. The HTMT ratio is calculated by dividing the correlation between two constructs by the square root of the product of the correlations of each construct with itself. A value below 0.85 indicates that the constructs are sufficiently different from each other. If the HTMT ratio is between 0.85 and 1.00, it suggests that the constructs may have weak discriminant validity and further investigation is needed. A value above 1.00 indicates that the constructs are highly correlated and likely measuring the same underlying construct, which is a violation of discriminant validity (Afthanorhan et al. 2021; Roemer et al. 2021). Table 5. 7 presents Heterotrait-monotrait (HTMT) ratio of correlations below:

**Table 5. 7 Heterotrait-monotrait (HTMT) ratio of correlations**

<b>Traits</b>	<b>OP</b>	<b>SCI</b>	<b>EMP</b>	<b>SPE</b>	<b>SPC</b>	<b>TMC</b>	<b>EPR</b>	<b>OPR</b>	<b>CSP</b>	<b>SSC M</b>
OP	-									
SCI	0.74	-								
EMP	0.65	0.73	-							
SPE	0.52	0.56	0.51	-						
SPC	0.61	0.62	0.53	0.58	-					
TMC	0.75	0.74	0.66	0.5	0.6	-				
EPR	0.59	0.61	0.57	0.53	0.51	0.61	-			
OPR	0.63	0.69	0.66	0.55	0.59	0.68	0.56	-		
CSP	0.58	0.64	0.56	0.53	0.52	0.63	0.51	0.58	-	
SSCM	0.67	0.71	0.62	0.59	0.56	0.7	0.58	0.65	0.61	-

Based on Table 5.7, the discriminant validity was established. Thus, the estimated HTMT for the individual variables had correlations that were less than 0.85 or 0.9 as advanced by empirical studies for establishing the attainment of discriminant validity of the data (Henseler et al. 2015).

### 5.3.5 Model Fit

Model fit in SEM refers to the degree of correspondence between the hypothesized model and the observed data. It provides an assessment of how well the model fits the data and indicates the overall quality of the model. Table 5. 8 portrays Goodness of Fit Summary:

*Table 5. 8 Goodness of Fit Summary*

	<b>Acceptable Threshold</b>	<b>Model</b>
Normed Chi-square	$\chi^2/df \leq 3$	2.783
Goodness of Fit Index (GFI)	>0.9	0.899
Root Mean Square Error of Approximation (RMSEA)	<0.05 or <0.8	0.046
Comparative Fit Index (CFI)	>0.9	0.970
Tucker-Lewis Index (TLI)	>0.9	0.966
Bentler-Bonett Normed Fit Index (NFI)	>0.9	0.962
Parsimony Normed Fit Index (PNFI)	>0.9	0.856

Source: (Wang, Xu, Wang, Tan & Chen 2020; Hair Jr., Matthews, Matthews & Sarstedt 2017; Marsh, Hau & Grayson 2013).

Root Mean Square Error of Approximation (RMSEA) measures the discrepancy between the hypothesized model and the population covariance matrix, taking into account model complexity. A lower RMSEA value suggests a better fit. Generally, values below 0.05 indicate excellent fit, values between 0.05 and 0.08 indicate good fit, and values above 0.10 indicate poor fit. The estimated model had RMSEA of 0.046 which fall between the 0.05 and 0.08 threshold (Lai & Green, 2016; Kenny, Kaniskan & Mccoach, 2015). Other measures of model fit such as CFI (0.970), TLI (0.966), and NFI (0.962) were able above the minimum required threshold for model fit set at >0.9 (Hair et al., 2017; Marsh et al., 2013). Generally, the model demonstrated a good fit.

### 5.3.6 Coefficient of determination (R2).

The coefficient of determination, sometimes referred to as R-squared (R2), is a statistical metric that reveals the percentage of the dependent variable's variation that can be predicted from the independent variable (s). Simply put, it assesses how well the independent variable(s) account for the variance in the dependent variable. From 0 to 1 is the range of the coefficient of determination. A score of 0 indicates that the independent variable(s) have no ability to predict the dependent variable, while a value of 1 shows that they are fully capable of explaining the variation in the dependent variable. Depending on the setting of the analysis, the coefficient of determination must be interpreted. A regression analysis, for instance, uses the R2 value to measure how well the model fits the data. A high R2 number signifies that the model adequately accounts for most of the variance in the dependent variable, whereas a low R2 value implies that the model does not adequately account for most of the variation in the dependent variable.

Table 5. 9 Model Summary

Model	R <sup>2</sup>	Adj. R <sup>2</sup>
1	0.996	0.996

Consequently, using the sample data given, it is discovered that the adjusted R-squared coefficient is Adjusted R<sup>2</sup>=0.996, indicating that around 99.6% of the variation in the dependent variable is explained by this linear regression model. When a model fits the data well and is at least partially consistent with the data, it is not necessarily necessary to re-specify it. The final result of the structural regression was provided in Table 5.10 below:

### 5.3.6 Regression Summary

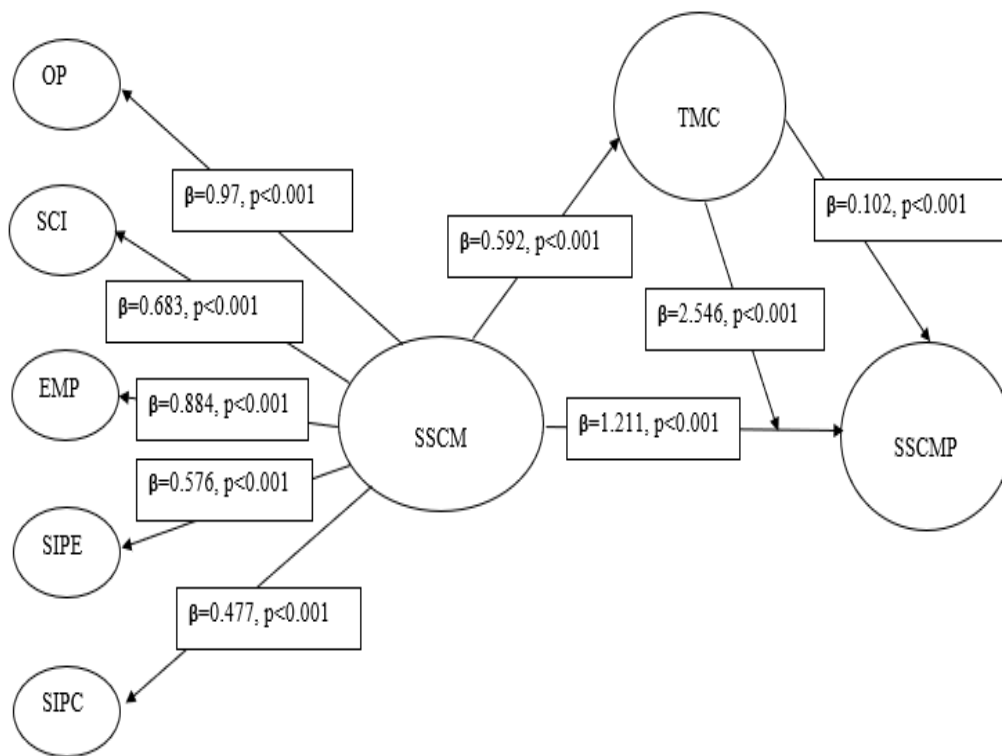
The final result of the structural regression was provided in Table 5.9.

Table 5. 10 Coefficient of Regression

Dep	Pred	$\beta$	SE	Standard ized Coeffie nt $\beta$ eta	z	p	Hypo these s	Status
	Constant	8286.786	1852.256		4.474	< .001		
SSCM<---	OP	0.975	0.016	0.898	60.938	< .001	H1a	Supported

Dep	Pred	$\beta$	SE	Standard ized Coefficient			Hypo these s	Status
				$\beta$	z	p		
SSCM<---	SCI	0.683	0.026	0.789	26.269	< .001	H1b	Supported
SSCM<---	EMP	0.884	0.025	0.664	35.360	< .001	H1c	Supported
SSCM<---	SPE	0.576	0.075	0.612	7.680	< .001	H1d	Supported
SSCM<---	SPC	0.477	0.056	0.567	8.518	< .001	H1e	Supported
SSCMP <- --	SSCM	1.211	0.108	1.060	11.203	< .001	H1	Supported
SSCMP <- --	TMC	0.102	0.017	0.109	5.965	< .001	H4	Supported
SSCMP <- --	Med (SSCM ⇒ TMC ⇒ SSCMP)	0.592	0.067	0.636	8.836	< .001	H3	Supported
SSCMP <- --	Mod (SSCM*TM C*SSCMP)	2.546	0.128	0.789	19.891	< .001	H2	Supported

The indicator hypotheses H1a, H1b, H1c, H1d, and H1e all had significant association with SSCM as indicated in Table 5.9 above. Thus, signifying that the regression weights were contributing significantly to SSCM. The findings demonstrate that SSCM has a significant and favourable association with SSCMP ( $\beta=1.211$ ,  $p < 0.01$ ) as indicated by H1. Also, the direct impact of TMC on SSCMP is significantly associated ( $\beta=0.102$ ,  $p < 0.01$ ) as indicated by H4. The moderation effect of TMC on the association between SSCM and SSCMP was found to be positively significant ( $\beta=2.546$ ,  $p < 0.01$ ). The mediation effect as indicated by H3 proved to be significant ( $\beta=0.592$ ,  $p < 0.01$ ). Figure 5. 1 presents the Structural Model for the study below:



**Figure 5. 1 Structural Model**

#### 5.4 Discussion of Results

The discussion of the findings is done to put the findings in the context of existing literature and make a case for justification of the objectives.

##### 5.4.1 Objectives 1: State of upstream pharmaceutical sustainable supply chain management practices in Ghana

The state of upstream pharmaceutical sustainable supply chain management practices in Ghana was investigated through interviews with 18 officials from various pharmaceutical companies. The interviews revealed several thematic issues related to the adoption of sustainable practices in the pharmaceutical industry in Ghana.

One prominent theme was responsible sourcing, where pharmaceutical companies are increasingly focused on ensuring that their raw materials and ingredients are sourced ethically and sustainably. This includes adherence to environmental regulations, good manufacturing practices, and avoidance of ingredients derived from endangered species or unethical practices.

The interviewees emphasized the importance of responsible sourcing in promoting transparency, respecting human rights, and preserving biodiversity. The work by Formentini and Taticchi (2016) explored corporate sustainability approaches and governance mechanisms in sustainable supply chain management. The study highlights the importance of responsible sourcing within the context of sustainable supply chain management. The authors emphasize that responsible sourcing is crucial for companies aiming to achieve sustainability goals and create a positive impact on society and the environment. It involves engaging with suppliers, setting clear standards and guidelines, and monitoring compliance to ensure that suppliers adhere to ethical and environmental standards. By adopting responsible sourcing practices, companies can contribute to environmental preservation, support local communities, and build trust with stakeholders, ultimately enhancing their sustainability performance and reputation (Formentini & Taticchi, 2016). Simply, responsible sourcing contributes as an indicator of Environmental Management Practices (EMP) deployed by pharmaceutical companies to ensure sustainable supply chain management.

Green manufacturing practices were also identified as an important aspect of sustainable supply chain management as advanced by several empirical studies (Al-Hakimi, Al-Swidi, Gelaidan & Mohammed, 2022; Afum et al., 2020). Pharmaceutical companies in Ghana were adopting energy-efficient technologies, waste management systems, and recycling initiatives to reduce energy consumption, water usage, waste generation, and emissions. These practices not only protect the environment but also enhance operational efficiency, reduce costs, and promote sustainable growth.

Packaging and waste management practices were highlighted as another area of focus for sustainable supply chain management in the pharmaceutical industry. Companies are working towards reducing the environmental impact of packaging materials by using recyclable or biodegradable materials and minimizing packaging waste. Proper disposal and recycling of pharmaceutical waste are also considered important to prevent environmental contamination as was stressed in earlier empirical study by (Teodor, Trică, Ignat & Drăcea, 2020). In the view of Teodor et al. (2020) by adopting these good practices, companies can reduce their ecological footprint, conserve resources, and contribute to a more sustainable and environmentally conscious packaging industry.

Supplier engagement and partnerships were found to be integral in promoting sustainability throughout the pharmaceutical supply chain. Collaboration with suppliers, distributors, and other stakeholders allows for the sharing of information, setting common sustainability goals, and implementing traceability systems to ensure transparency and accountability. Building long-term relationships based on trust and transparency helps enhance supplier capabilities and jointly work towards a sustainable and ethical supply chain. The study conducted by Dahlmann and Roehrich (2019) identified partner engagement as a crucial factor in achieving sustainable outcomes. By collaborating closely with supply chain partners, companies can share information, set common sustainability goals, and implement strategies to manage climate change information effectively. Through effective partner engagement, companies can enhance their capacity to address and promote sustainable practices and achieve collective environmental goals within the supply chain (Dahlmann & Roehrich, 2019).

Lastly, socially inclusive practices were identified as an important aspect of sustainable supply chain management in the pharmaceutical industry. Companies operating in communities within Ghana are actively engaging with local stakeholders, investing in education and healthcare initiatives, and prioritizing employment opportunities for marginalized groups. This socially inclusive approach not only addresses the unique healthcare needs of the community but also provides strategic advantages, such as harnessing diverse talents and perspectives to drive innovation. According to research, employing socially inclusive practices for staff members may enhance supply chain effectiveness. For instance, research by Klassen and Vereecke (2012) discovered that social sustainability programs and fair labor standards enhanced the performance of suppliers in terms of cost, quality, delivery, and flexibility. Beske and Seuring (2014) observed in another study that supplier performance in terms of quality, delivery, and innovation were favourably influenced by socially responsible human resource management strategies. Socially inclusive policies can also increase employee productivity and motivation, which can enhance the efficiency of the supply chain.

Overall, the interviews highlighted the growing adoption of sustainable supply chain management practices in the upstream pharmaceutical industry in Ghana. Responsible sourcing, green manufacturing, packaging and waste management, supplier engagement and partnerships, and socially inclusive practices were identified as key areas of focus. By integrating these practices into their operations, pharmaceutical companies aim to promote

ethical and sustainable practices, reduce their environmental footprint, and contribute to the well-being of local communities and the industry as a whole.

#### **5.4.2 Objective 2: Role of the upstream pharmaceutical policy framework of Ghana on the supply chain sustainability**

The pharmaceutical policy framework in Ghana plays a crucial role in influencing and impacting the sustainability of the pharmaceutical supply chain. The policy framework emphasizes local manufacturing and sourcing, which contributes to supply chain sustainability by reducing reliance on imports, minimizing transportation-related emissions, and creating employment opportunities.

Local manufacturing also enhances the resilience of the supply chain and improves access to affordable, high-quality medicines. The framework's focus on quality assurance and good manufacturing practices ensures that pharmaceutical products meet safety and quality standards, minimizing product recalls, waste, and the risk of substandard or counterfeit medicines entering the supply chain.

Regulatory compliance, enforced by the Ghana Food and Drugs Authority (FDA), promotes responsible and ethical operations among pharmaceutical companies, maintaining the integrity of the supply chain and fostering transparency and accountability. The policy framework also protects intellectual property rights, encouraging innovation, research, and development in the pharmaceutical sector. By safeguarding the rights of innovators and creators, the framework incentivizes investment in sustainable practices and the development of new technologies, products, and manufacturing processes. Respecting intellectual property rights attracts foreign direct investment, stimulates collaboration and knowledge sharing, and contributes to the growth and competitiveness of the pharmaceutical industry in Ghana. Overall, the pharmaceutical policy framework in Ghana addresses various aspects of sustainability, including local manufacturing, quality assurance, regulatory compliance, and intellectual property rights protection, all of which are essential for building a sustainable and resilient pharmaceutical supply chain that meets the healthcare needs of the population.

#### **5.4.3 Objective 3: How upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana.**

The proxies of SSCM such as OP, SCI, EMP, SIPE, and Socially Inclusive Practices for Community (SIPC) were assessed using the factor loading with each of the proxies

demonstrating strong loadings. SSCMP was also measured using proxies such as EPR, OPR, and CSP. These indicators also showed high and or strong factor loadings above the minimum threshold of 0.7. The structural equation modeling demonstrated that there is a significant positive association between SSCM and SSCMP. This finding supports hypothesis 1 (H1) of the study. Again, the finding collaborates earlier studies conducted by Das (2018). The study by Das (2018) examines the impact of SSCM practices on firm performance, focusing on lessons learned from Indian organizations. The study explores the relationship between SSCM practices, including green procurement, reverse logistics, environmental collaboration, and environmental certifications, and firm performance indicators such as financial performance, operational performance, and environmental performance. The findings indicate that implementing SSCM practices positively influences firm performance, including cost savings, improved operational efficiency, enhanced customer satisfaction, and reduced environmental impact. The study highlights the importance of integrating sustainable practices into supply chain operations, emphasizing the potential benefits for firms in terms of both financial and environmental performance. Similarly, in the study by Isnaini et al. (2020) examined how sustainable supply chain management practices impact organizational sustainable performance and whether supply chain dynamic capabilities have a moderating role in this relationship. The findings of the study revealed that sustainable supply chain management practices have a positive and significant effect on organizational sustainable performance in the restaurant industry in Indonesia. This indicates that implementing sustainable practices in the supply chain can lead to improved organizational sustainability (Isnaini, Nurhaida & Pratama, 2020). Overall, there are considerable indications that firms that adopt sustainable supply chain management practices are able to impact organizational sustainable performance.

#### **5.4.4 Objective 4: Role of top management in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana.**

The role of Top Management in ensuring adoption and implementation of upstream pharmaceutical sustainable supply chain management practices was examined on two fronts: as a mediator and as a moderator. Thus, the moderation effect of TMC on the association between SSCM and SSCMP was found to be positively significant ( $\beta=2.546$ ,  $p < 0.01$ ) which is H2. The mediation effect as indicated by H3 proved to be significant ( $\beta=0.592$ ,  $p < 0.01$ ). Earlier empirical studies have demonstrated the significant role of top management commitment to ensuring that there is increase in the adoption and implementation of supply

chain management practices (Ahmed et al., 2021; Sandberg & Abrahamsson, 2010). The study by Sandberg and Abrahamsson (2010) examines the role of top management in supply chain management practices. The findings of the study highlight several key roles and responsibilities of top management in supply chain management practices.

Firstly, top management is responsible for setting the strategic direction and goals for the supply chain. They play a crucial role in aligning supply chain activities with the overall business strategy and objectives of the organization. Furthermore, top management is responsible for making critical decisions about supply chain design, partner selection, and resource allocation. Their decisions shape the structure and operation of the supply chain and impact its performance and effectiveness. Finally, top management acts as change agents and drives the adoption of supply chain management practices within the organization. They provide the necessary resources, support, and guidance to ensure successful implementation of supply chain initiatives. They also create a culture of collaboration, knowledge sharing, maintaining strategic alliances and ensuring effective communication and coordination across the supply chain network. Top management plays a critical role in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana. Their leadership, commitment, and strategic decision-making are essential for driving sustainability initiatives throughout the organization. Here are some key roles that top management should fulfill:

1. **Setting the Vision and Goals:** Top management should define the vision and goals for sustainable supply chain management in the pharmaceutical industry. They should establish a clear direction and articulate the importance of sustainability, aligning it with the organization's overall mission and values. This vision provides guidance and serves as a reference point for all sustainability efforts.
2. **Establishing Policies and Procedures:** Top management should develop and implement policies and procedures that promote sustainable supply chain practices. These policies should encompass responsible sourcing, green manufacturing, waste management, supplier engagement, and social inclusivity. By establishing clear guidelines, top management ensures that sustainability principles are integrated into daily operations and decision-making processes.
3. **Allocating Resources:** Top management plays a crucial role in allocating resources to support sustainable supply chain management practices. This includes providing financial investments, technological resources, and human capital necessary for implementing and monitoring

sustainability initiatives. Adequate resource allocation demonstrates the commitment of top management to sustainability and facilitates the effective implementation of sustainable practices.

4. **Creating a Culture of Sustainability:** Top management should foster a culture of sustainability throughout the organization. This involves promoting awareness, education, and training programs to enhance employees' understanding of sustainable supply chain management practices. By championing sustainability, top management encourages employees at all levels to adopt sustainable behaviors and integrate sustainability considerations into their daily work routines.
5. **Collaboration and Stakeholder Engagement:** Top management should actively engage with internal and external stakeholders, including suppliers, customers, regulatory bodies, and local communities. They should foster collaboration, establish partnerships, and seek feedback to continuously improve sustainable supply chain practices. By involving stakeholders in decision-making processes, top management promotes transparency, accountability, and shared responsibility for sustainability outcomes.
6. **Monitoring and Performance Measurement:** Top management should establish mechanisms to monitor and measure the performance of sustainable supply chain management practices. This involves defining key performance indicators (KPIs), conducting regular audits, and tracking progress towards sustainability goals. By monitoring performance, top management can identify areas for improvement, address challenges, and make informed decisions based on reliable data.
7. **Continuous Improvement and Innovation:** Top management should promote a culture of continuous improvement and innovation in sustainable supply chain management practices. They should encourage employees to explore new ideas, technologies, and best practices that enhance sustainability performance. By fostering a spirit of innovation, top management ensures that the organization remains at the forefront of sustainable supply chain management practices.

In summary, top management plays a pivotal role in driving sustainable supply chain management practices in the upstream pharmaceutical industry in Ghana. Their leadership, commitment, and strategic actions are essential for creating a culture of sustainability, setting goals, allocating resources, engaging stakeholders, monitoring performance, and fostering continuous improvement. By fulfilling these roles, top management can ensure that sustainable

practices are embedded throughout the organization and contribute to long-term environmental, social, and economic sustainability.

## CHAPTER SIX

### SUMMARY OF FINDINGS AND CONTRIBUTIONS

#### 6.1 Introduction

The chapter provides a thorough discussion of the findings within the context of existing literature. Thus, the findings were situated based on earlier empirical evidence. Summary of findings were presented first and followed by the discussion sections.

#### 6.2 Summary of Findings

##### 6.2.1 Objective 1 Findings

The interviews brought to light the upstream pharmaceutical sector in Ghana's implementation of SSCM methods. Key areas of attention were socially inclusive practices, eco-friendly manufacturing, packaging and waste management, supplier involvement, and collaborations. Pharmaceutical firms hope to encourage moral and sustainable behaviour, lessen their environmental impact, and improve the well-being of nearby communities and the industry at large by incorporating these principles into their daily operations. The findings from the interviews on upstream pharmaceutical SSCM practices in Ghana have several theoretical, managerial, and policy implications.

##### 6.2.1.1 Theoretical Contribution

From a theoretical perspective, the interviews shed light on the importance of responsible sourcing as a crucial component of sustainable supply chain management. This aligns with the work by Formentini and Taticchi (2016), which emphasizes the significance of responsible sourcing in achieving sustainability goals and creating a positive impact on society and the environment. The integration of responsible sourcing practices into the supply chain can be seen as an indicator of environmental management practices deployed by pharmaceutical companies, ensuring sustainable supply chain management (Formentini & Taticchi, 2016).

##### 6.2.1.2 Managerial Contribution

Managerially, the study highlighted the adoption of green manufacturing practices, packaging and waste management practices, and supplier engagement and partnerships as key strategies for achieving sustainability in the pharmaceutical supply chain. These practices contribute to reducing energy consumption, waste generation, and environmental impact while enhancing operational efficiency, cost reduction, and sustainable growth. The empirical studies referenced, such as those by Afum et al. (2020), Al-Hakimi et al. (2022), and Teodor et al.

(2020), provide further support for these practices and their positive outcomes. Pharmaceutical companies in Ghana can benefit from implementing these practices to improve their sustainability performance, operational efficiency, and environmental consciousness (Al-Hakimi et al. 2022; Afum et al. 2020).

Furthermore, the interviews highlighted the significance of socially inclusive practices in the pharmaceutical industry. Companies engaging with local stakeholders, investing in education and healthcare initiatives, and providing employment opportunities to marginalized groups demonstrate their commitment to social sustainability. This socially inclusive approach not only addresses the healthcare needs of the community, but also provides strategic advantages by fostering diverse talents and perspectives. The research conducted by Klassen and Vereecke (2012) and Beske and Seuring (2014) further support the positive influence of socially responsible human resource management strategies on supplier performance.

#### **6.2.1.3 Policy Contribution**

Policy-wise, the interviews underscored the importance of supportive policies and regulations that promote responsible sourcing, green manufacturing, waste management, and supplier engagement in the pharmaceutical industry. The policy framework of Ghana plays a crucial role in influencing and impacting the sustainability of the pharmaceutical supply chain. Policymakers can use the insights from the interviews to further develop and strengthen regulations that encourage sustainable practices, ethical sourcing, waste reduction, and collaboration among industry stakeholders. These policies can contribute to building a sustainable and resilient pharmaceutical supply chain in Ghana and create an enabling environment for companies to adopt and integrate sustainable practices into their operations.

In conclusion, the study on upstream pharmaceutical SSCM practices in Ghana provides valuable insights for theoretical, managerial, and policy implications. Responsible sourcing, green manufacturing, packaging and waste management, supplier engagement and partnerships, and socially inclusive practices emerge as key areas of focus. By integrating these practices, pharmaceutical companies can contribute to sustainability, reduce their environmental footprint, and enhance their performance while promoting ethical practices and benefiting local communities. Policymakers can leverage these findings to develop supportive regulations and create an enabling environment for sustainable supply chain management in the pharmaceutical industry.

### **6.2.2 Objective 2 Findings**

Ghana's pharmaceutical policy aims to achieve universal access to critical medications, ensure quality control, establish an efficient supply chain, and promote responsible use of medications. The policy relies on various institutions, including the National Medicines Policy and the Ghana Food and Drugs Authority (FDA), to implement its objectives. Local pharmaceutical manufacturing is encouraged to reduce reliance on imports, create job opportunities, and enhance the resilience of the supply chain. The policy framework also emphasizes quality assurance and good manufacturing practices to ensure safe and effective medicines. Regulatory compliance, enforced by the FDA, maintains the integrity of the supply chain, while intellectual property rights protection incentivizes innovation and research in the industry. The pharmaceutical policy framework in Ghana influences and impacts sustainability of the pharmaceutical supply chain. The theoretical, managerial, and policy implications of the findings on objective 2 are indicated below:

#### **6.2.2.1 Theoretical Implications**

1. **Integration of Local Manufacturing and Sourcing:** The policy framework emphasizes the importance of promoting local pharmaceutical manufacturing. This aligns with the theoretical concept of reducing dependency on imports and establishing shorter supply chains, which can contribute to sustainability by minimizing transportation-related emissions, logistical challenges, and supply disruptions.
2. **Quality Assurance and Good Manufacturing Practices:** The policy framework focuses on enforcing quality assurance and adherence to good manufacturing practices. This aligns with the theoretical principle of ensuring product quality, safety, and efficacy throughout the supply chain, minimizing the environmental and economic impact of poor-quality or unsafe products.
3. **Regulatory Compliance:** The policy framework establishes regulations and standards enforced by the FDA. Compliance with these regulations fosters transparency, accountability, and integrity in the supply chain. The theoretical implication is that regulatory compliance plays a crucial role in maintaining the sustainability of the pharmaceutical supply chain.
4. **Intellectual Property Rights (IPR):** The policy framework protects intellectual property rights in the pharmaceutical sector. This encourages innovation, research, and development, which are important for enhancing supply chain sustainability. Theoretical implications suggest that IPR protection incentivizes investment in sustainable practices, new technologies, and manufacturing processes.

### **6.2.2.2 Managerial Implications:**

1. **Local Manufacturing and Sourcing:** Pharmaceutical companies operating in Ghana should consider investing in local manufacturing and sourcing practices. By doing so, they can reduce their dependency on imports, contribute to the economy, create employment opportunities, and establish a more resilient and sustainable supply chain.
2. **Quality Assurance and Good Manufacturing Practices:** Managers should prioritize and invest in quality assurance and adhere to good manufacturing practices. This involves maintaining strict control over manufacturing processes, implementing comprehensive quality management systems, and continuously improving manufacturing processes to ensure the consistent delivery of safe and effective medicines.
3. **Regulatory Compliance:** Managers need to ensure their companies comply with the regulations set forth by the Ghana FDA and other relevant authorities. This includes obtaining proper licensing, product registration, and conducting regular audits to demonstrate their commitment to safety, efficacy, and quality. Adherence to regulatory requirements fosters trust among healthcare professionals and patients and maintains the integrity of the pharmaceutical industry.
4. **Intellectual Property Rights (IPR):** Companies should respect intellectual property rights, including patents and copyrights. Respecting IPR encourages fair competition, innovation, and investment in sustainable practices. It also facilitates technology transfer, knowledge sharing, and collaboration, strengthening the local pharmaceutical industry in Ghana.

### **6.2.2.3 Policy Implications**

1. **Strengthening the Policy Framework:** The Ghanaian government should continue to strengthen the pharmaceutical policy framework by prioritizing universal access to critical medications, quality control, functional supply chain, and responsible use of medications. This can be achieved through regular updates, alignment with international best practices, and stakeholder collaboration.
2. **Support for Local Manufacturing:** The government should provide continued support and incentives for local pharmaceutical manufacturers. This can include initiatives to promote technology transfer, research and development, and investments in enhancing local production capacity. Supporting local manufacturing contributes to supply chain sustainability, economic growth, and job creation.

3. **Enforcement and Capacity Building:** Regulatory authorities, such as the Ghana FDA, should focus on effective enforcement of regulations and guidelines. This includes ensuring proper oversight, registration, post-market surveillance, and monitoring of pharmaceutical products. Capacity building programs can be implemented to enhance the regulatory capabilities of authorities and industry stakeholders.
4. **Collaboration and Partnerships:** The policy framework should encourage collaboration and partnerships among industry stakeholders, including pharmaceutical companies, regulatory bodies, healthcare providers, and local communities. Collaborative efforts can facilitate information sharing, setting common sustainability goals, and implementing traceability systems, ultimately promoting transparency,

### **6.2.3 Findings on objective 3.**

The results of the structural equation modelling showed that SSCM and performance are significantly positively correlated with SSCMP. This result is consistent with research hypothesis 1 (H1). Once more, the discovery supports prior research by Das (2018) and Isnaini et al (2020). Based on the findings, the following contributions are made:

#### **6.2.3.1 Theoretical Implications:**

1. The study contributes to the existing literature by providing empirical evidence of the positive association between SSCM and SSCMP. This finding supports the theoretical understanding that implementing sustainable practices in the supply chain can lead to improved organizational sustainability.
2. The study validates the importance of various proxies of sustainable supply chain management, including operational practices, supply chain integration, environmental management practices, socially inclusive practices for employees, and socially inclusive practices for the community. These proxies demonstrate strong loadings, indicating their relevance in measuring sustainable supply chain management.

#### **6.2.3.2 Managerial Implications:**

1. The findings highlight the significance of adopting sustainable supply chain management practices for firms in the restaurant industry in Indonesia. Implementing operational practices, supply chain integration, environmental management practices, and socially inclusive practices can positively influence organizational sustainable performance.

2. Managers in the restaurant industry should prioritize the integration of sustainable practices into their supply chain operations. This can lead to benefits such as cost savings, improved operational efficiency, enhanced customer satisfaction, and reduced environmental impact.
3. The study emphasizes the need for developing supply chain dynamic capabilities. Firms should focus on enhancing their ability to adapt and respond to changes in the dynamic business environment, as it can moderate the relationship between sustainable supply chain management practices and organizational sustainable performance.

### **6.2.3.3 Policy Implications**

1. Policymakers should promote and encourage the adoption of sustainable supply chain management practices across industries, including the restaurant sector. This can be done through the development of guidelines, incentives, and regulations that support sustainable practices.
2. Governments and relevant authorities should provide support for capacity-building programs and initiatives that enhance supply chain dynamic capabilities. This can help businesses in effectively implementing sustainable practices and achieving better performance outcomes.
3. Policymakers should collaborate with industry associations and stakeholders to create awareness and disseminate best practices related to sustainable supply chain management. This can facilitate knowledge-sharing and encourage widespread adoption of sustainable practices in the supply chain.

Overall, the study's findings have important implications for both theory and practice, providing insights into the relationship between sustainable supply chain management practices and organizational sustainable performance, and highlighting the potential benefits for firms and the importance of policy support in promoting sustainability in supply chain operations.

### **6.2.4 Objective 4 Finding**

The implications of the role of top management in ensuring the adoption and implementation of upstream pharmaceutical sustainable supply chain management practices are multi-faceted. These implications can be categorized into theoretical, managerial, and policy implications:

#### **6.2.4.1 Theoretical Implications:**

1. **Mediation Effect:** The study findings indicated that top management commitment (TMC) mediates the relationship between SSCM and SSCMP. This implies that the influence of SSCM on SSCMP is channeled through top management commitment. The study contributes to the theoretical understanding of the role of TMC as a mediator in the relationship between SSCM and SSCMP.
2. **Moderation Effect:** The study also reveals that top management commitment (TMC) has a significant positive moderation effect on the association between SSCM and SSCMP. This suggests that the relationship between SSCM and SSCMP is stronger when there is a higher level of top management commitment. The findings contribute to the literature by highlighting the importance of top management commitment in enhancing the impact of SSCM on SSCMP.

#### **6.2.4.2 Managerial Implications**

1. **Leadership and Vision:** The study underscored the critical role of top management in setting the vision and goals for sustainable supply chain management. Managers should provide clear guidance and articulate the importance of sustainability, aligning it with the overall strategic direction of the organization. This helps create a shared understanding and commitment to sustainable practices among employees.
2. **Resource Allocation:** Top management plays a crucial role in allocating resources to support sustainable supply chain management practices. Adequate financial, technological, and human resources should be allocated to enable the successful implementation and monitoring of sustainability initiatives. This highlights the importance of securing the necessary resources to drive sustainable practices effectively.
3. **Collaboration and Stakeholder Engagement:** Top management should actively engage with internal and external stakeholders to promote sustainability. Building partnerships, seeking feedback, and involving stakeholders in decision-making processes foster transparency, accountability, and shared responsibility for sustainability outcomes. Collaboration with suppliers, customers, regulatory bodies, and local communities can enhance the effectiveness of sustainable supply chain management.

### 6.2.4.3 Policy Implications

1. **Policy Support:** Policymakers should recognize and support the role of top management in driving sustainable supply chain management practices. Policies and regulations can encourage and incentivize companies to prioritize sustainability and provide frameworks for responsible sourcing, green manufacturing, waste management, supplier engagement, and social inclusivity.
2. **Education and Training:** Policies should promote education and training programs to enhance the understanding of sustainable supply chain management practices among top management and employees. By investing in capacity building, policymakers can empower organizations to implement sustainable practices effectively and drive positive environmental and social change.
3. **Reporting and Disclosure:** Policymakers can promote transparency and accountability by requiring organizations to report on their sustainable supply chain management practices. This can include disclosing information on responsible sourcing, green manufacturing initiatives, waste management strategies, supplier engagement, and social inclusivity efforts. Clear reporting guidelines and standards can facilitate benchmarking and encourage continuous improvement.

In conclusion, the role of top management in ensuring upstream pharmaceutical sustainable supply chain management practices has implications at various levels. Theoretical implications contribute to our understanding of the mediating and moderating effects of top management commitment. Managerial implications highlight the leadership, resource allocation, collaboration, and stakeholder engagement responsibilities of top management. Policy implications emphasize the need for supportive policies, education and training, and reporting mechanisms to promote and enhance sustainable supply chain management practices. By considering these implications, organizations and policymakers can work towards fostering sustainable practices in the pharmaceutical industry and beyond.

## CHAPTER SEVEN

### CONCLUSIONS AND RECOMMENDATIONS

#### 7.1 Introduction

The chapter provides conclusions based on the SSCM in the upstream pharmaceutical industry in Ghana, the role of top management commitment in ensuring increased business performance and Sustainable Supply Chain Management, and performance. Based on the research findings, several recommendations are provided for organizations, the pharmaceutical industry, and policymakers. Finally, the study suggests future research areas.

#### 7.2 Conclusion

The conclusion of the study is provided based on the research objectives raised in chapter one. Focus is given to SSCM, performance outcomes, and role of top management in driving the adoption and attainment of sustainable SSCMP.

##### 7.2.1 Impact of Sustainable supply chain management (SSCM) on performance outcomes.

This study focused on assessing the proxies of SSCM and their impact on sustainable SSCMP. The proxies, including operational practices, supply chain integration, environmental management practices, socially inclusive practices for employees, and socially inclusive practices for the community, demonstrated strong factor loadings, indicating their relevance in measuring SSCM. Similarly, the indicators used to measure SSCMP, such as environmental performance, operations performance, and community-centred social performance, also showed high and strong factor loadings, indicating their suitability for assessing the performance outcomes of SSCM.

The structural equation modelling revealed a significant positive association between SSCM and SSCMP, supporting hypothesis 1 (H1) of the study. This finding aligns with earlier studies, particularly the research by Das (2018), which emphasized the positive impact of SSCM practices on firm performance. Furthermore, the study by Isnaini et al. (2020) explored the impact of sustainable supply chain management practices on organizational sustainable performance. The findings demonstrated that implementing sustainable practices in the supply chain positively influences organizational sustainability. Overall, the results from this study indicate that firms that adopt sustainable supply chain management practices are likely to experience improved organizational sustainable performance. This highlights the importance of integrating sustainable practices into supply chain operations, as it can lead to positive

outcomes in terms of financial performance, operational efficiency, customer satisfaction, and environmental impact.

The findings emphasized the need for organizations to prioritize sustainability and demonstrate top management commitment towards implementing sustainable practices. By doing so, firms can enhance their competitive advantage, meet regulatory requirements, and contribute to the overall well-being of the environment and society. Moving forward, it is essential for businesses to continue exploring innovative approaches and developing dynamic capabilities within their supply chains to further enhance sustainable performance and long-term success.

### **7.2.2 Top Management Commitment in ensuring the increased business performance.**

Top Management Commitment (TMC) plays a vital role in ensuring business performance in the pharmaceutical industry. TMC refers to the active involvement, support, and leadership of top-level executives in driving organizational goals and objectives. In the pharmaceutical industry, where stringent regulations, complex research and development processes, and intense competition prevail, TMC becomes even more crucial for success.

Firstly, TMC sets the tone for the entire organization. When top management demonstrates a strong commitment to business performance, it establishes a clear message to employees that the company's goals and objectives are a priority. This commitment cascades down the organizational hierarchy, fostering a culture of dedication and accountability. Employees are more likely to align their actions and decisions with the overall business strategy when they witness top management's unwavering commitment.

Moreover, TMC ensures the allocation of necessary resources for business performance. Top management is responsible for strategic decision-making, including resource allocation, budgeting, and investment decisions. When management is committed to achieving business goals, they are more likely to allocate adequate resources to critical areas such as research and development, quality control, marketing, and talent acquisition. This ensures that the organization has the necessary tools, technologies, and skilled personnel to deliver high-quality products, meet regulatory requirements, and stay competitive.

Additionally, TMC drives innovation and adaptation in the pharmaceutical industry. The industry is highly dynamic, with advancements in medical science, changing market demands, and evolving regulatory landscapes. Top management commitment encourages a proactive and forward-thinking approach to identify and seize opportunities, adapt to market changes, and

embrace new technologies. By fostering a culture of innovation, TMC enables the organization to stay at the forefront of scientific discoveries, develop novel therapies, and respond effectively to emerging trends and challenges.

Furthermore, TMC plays a crucial role in ensuring compliance and ethical conduct within the pharmaceutical industry. Top management commitment to ethical business practices, transparency, and regulatory compliance sets the tone for the entire organization. It establishes a culture of integrity and accountability, promoting adherence to industry regulations, ethical guidelines, and safety standards. This commitment safeguards the reputation of the company, builds trust with stakeholders, and mitigates potential legal and reputational risks.

In conclusion, TMC is essential in ensuring business performance within the pharmaceutical industry. It sets the organizational tone, allocates necessary resources, drives innovation and adaptation, and promotes compliance and ethical conduct. Through their active involvement and leadership, top management plays a pivotal role in guiding the organization towards achieving its goals and maintaining a competitive edge in a challenging and highly regulated industry.

### **7.2.3 Top Management Commitment (TMC) in ensuring sustainable supply chain management performance.**

TMC plays a critical role in ensuring sustainable supply chain management performance in the pharmaceutical industry. As the industry faces increasing scrutiny and regulatory requirements related to sustainability, TMC becomes paramount in driving sustainable practices throughout the supply chain.

First and foremost, TMC sets the vision and strategic direction for sustainable supply chain management. When top management demonstrates a strong commitment to sustainability, it creates a sense of purpose and responsibility within the organization. This commitment provides a clear message that sustainable practices are integral to the company's values and long-term success. By setting ambitious sustainability goals and incorporating them into the overall business strategy, top management provides guidance and direction for sustainable supply chain management.

Moreover, TMC drives the integration of sustainability into supply chain processes. Top management's commitment influences decision-making at all levels of the organization, ensuring that sustainability considerations are embedded into supply chain operations. This

includes areas such as supplier selection and evaluation, green procurement practices, waste reduction, energy efficiency, and carbon footprint management. When top management emphasizes sustainability as a priority, it encourages employees and suppliers to adopt sustainable practices and seek continuous improvement in their operations.

Furthermore, TMC enables the allocation of resources for sustainable supply chain initiatives. Top management plays a crucial role in resource allocation and budgeting decisions. When sustainability is a priority, adequate resources can be allocated to initiatives such as implementing eco-friendly packaging, investing in renewable energy, conducting lifecycle assessments, and developing sustainability training programs for employees. TMC ensures that financial and human resources are dedicated to sustainable supply chain management, enabling the organization to make tangible progress towards sustainability goals.

Additionally, TMC fosters collaboration and partnerships for sustainable supply chain management. Top management commitment creates a culture of collaboration both internally and externally. Internally, it encourages cross-functional teams to work together towards sustainability objectives, promoting knowledge-sharing and innovation. Externally, top management can engage with suppliers, customers, and other stakeholders to drive sustainable practices across the entire supply chain. By building strong relationships and partnerships, top management can influence and incentivize suppliers to adopt sustainable practices and align with the company's sustainability goals.

In conclusion, TMC plays a crucial role in ensuring sustainable supply chain management performance within the pharmaceutical industry. TMC sets the vision and strategic direction, drives integration of sustainability into supply chain processes, enables resource allocation for sustainable initiatives, and fosters collaboration with stakeholders. By demonstrating unwavering commitment to sustainability, top management establishes a culture of responsibility, innovation, and continuous improvement throughout the pharmaceutical supply chain, contributing to long-term business success and environmental stewardship.

### **7.3 Recommendations**

The recommendations in this section of the study are focused primarily on the findings and juxtaposing same with earlier empirical studies. This helped to provide practical and theoretical recommendations for organizations, industry, and policy in general.

### **7.3.1 Recommendation for the adoption of Sustainable supply chain management (SSCM) for improved performance outcomes**

Based on the findings from the interviews with officials from various pharmaceutical companies in Ghana, several recommendations can be made to enhance sustainable supply chain management practices in the upstream pharmaceutical industry:

1. **Promote Responsible Sourcing:** Pharmaceutical companies should prioritize responsible sourcing practices by engaging with suppliers, setting clear standards and guidelines, and monitoring compliance with ethical and environmental standards. This will ensure that raw materials and ingredients are sourced ethically and sustainably, promoting transparency, respecting human rights, and preserving biodiversity.
2. **Adopt Green Manufacturing Practices:** Embrace energy-efficient technologies, waste management systems, and recycling initiatives to reduce energy consumption, water usage, waste generation, and emissions. These practices not only protect the environment but also enhance operational efficiency, reduce costs, and promote sustainable growth.
3. **Improve Packaging and Waste Management:** Focus on reducing the environmental impact of packaging materials by using recyclable or biodegradable materials and minimizing packaging waste. Implement proper disposal and recycling of pharmaceutical waste to prevent environmental contamination and contribute to a more sustainable and environmentally conscious packaging industry.
4. **Foster Supplier Engagement and Partnerships:** Collaborate closely with suppliers, distributors, and other stakeholders to share information, set common sustainability goals, and implement traceability systems. Building long-term relationships based on trust and transparency enhances supplier capabilities and enables joint efforts towards a sustainable and ethical supply chain.
5. **Embrace Socially Inclusive Practices:** Actively engage with local stakeholders, invest in education and healthcare initiatives, and prioritize employment opportunities for marginalized groups. This socially inclusive approach addresses community healthcare needs, harnesses diverse talents, and drives innovation. Additionally, socially inclusive policies can increase employee productivity and motivation, enhancing supply chain efficiency.

These recommendations align with existing empirical studies that highlight the importance of responsible sourcing, green manufacturing, packaging and waste management, supplier engagement, and socially inclusive practices in achieving sustainable outcomes in supply chain

management. By implementing these recommendations, pharmaceutical companies in Ghana can contribute to ethical and sustainable practices, reduce their environmental footprint, and positively impact local communities and the industry as a whole.

### **7.3.2 Recommendation for Top Management Commitment (TMC) for attainment of sustainable supply chain management performance.**

Based on the implications of the role of top management in ensuring the adoption and implementation of sustainable supply chain management practices in the upstream of pharmaceutical industry in Ghana, the following recommendations can be made for the attention of the pharmaceutical organizations, the industry, and for policy:

For Organizations in the Pharmaceutical Industry:

1. **Develop a Sustainability Strategy:** Pharmaceutical companies should develop a comprehensive sustainability strategy that integrates sustainable supply chain management practices. This strategy should outline specific goals, targets, and action plans to address responsible sourcing, green manufacturing, packaging waste management, supplier engagement, and social inclusivity.
2. **Establish Supplier Collaboration Programs:** Implement supplier collaboration programs to engage suppliers in sustainable practices. This can include regular communication, training, and capacity-building initiatives to ensure suppliers understand and adhere to ethical and environmental standards. Collaboration can drive innovation and foster a sustainable supply chain ecosystem.
3. **Invest in Technology and Innovation:** Embrace technology and innovation to improve sustainability performance in the pharmaceutical supply chain. Explore energy-efficient manufacturing processes, waste reduction technologies, and digital solutions for traceability and transparency. Adopting innovative practices can enhance efficiency, reduce costs, and minimize environmental impact.
4. **Establish Cross-Functional Collaboration:** Top management should facilitate collaboration and coordination across different functions and departments within the organization. This involves breaking down silos and fostering a culture of cross-functional teamwork to drive sustainable supply chain management. Encourage knowledge sharing, regular communication, and joint decision-making to ensure a holistic and integrated approach to sustainability.

5. **Develop Supplier Engagement Programs:** Top management should establish supplier engagement programs that promote sustainable practices throughout the supply chain. This includes assessing suppliers' sustainability performance, providing guidance and support for improvement, and recognizing and rewarding suppliers that excel in sustainability. Collaboration with suppliers is crucial for driving sustainability throughout the value chain.

For the Pharmaceutical Industry:

1. **Promote Industry-wide Collaboration:** Industry associations and organizations should facilitate collaboration among pharmaceutical companies to share best practices, knowledge, and resources related to sustainable supply chain management. Collaboration can drive collective action, accelerate progress, and establish industry standards for sustainability.
2. **Encourage Supplier Certification and Compliance:** Encourage pharmaceutical companies to prioritize suppliers who adhere to recognized sustainability certifications and standards. This promotes responsible sourcing and ensures that suppliers meet ethical and environmental requirements. Industry-wide initiatives can facilitate supplier certification and encourage compliance.
3. **Foster Continuous Improvement:** Pharmaceutical companies should embrace a culture of continuous improvement in sustainable supply chain management. Regularly assess performance, track key performance indicators, and benchmark against industry peers. Sharing success stories and lessons learned can inspire others to adopt sustainable practices.

For Policy Considerations:

1. **Develop Regulatory Frameworks:** Policymakers should develop and enforce regulatory frameworks that encourage sustainable supply chain management practices in the pharmaceutical industry. These regulations can address responsible sourcing, waste management, energy efficiency, and social inclusivity, providing clear guidelines for companies to follow.
2. **Incentivize Sustainability Practices:** Governments can provide incentives, such as tax breaks or grants, to encourage pharmaceutical companies to invest in sustainable supply chain management practices. Financial support can help offset initial costs and promote the adoption of sustainable technologies and practices.

3. **Support Research and Development:** Policymakers should support research and development efforts aimed at finding sustainable alternatives in the pharmaceutical industry. This can include funding research on eco-friendly packaging materials, green manufacturing processes, and sustainable sourcing methods.
4. **Enhance Reporting and Transparency:** Governments can require pharmaceutical companies to report on their sustainable supply chain management practices. This promotes transparency, accountability, and public awareness of sustainability efforts. Establishing reporting standards and frameworks can facilitate consistent and comparable reporting across the industry.

By implementing these recommendations, organizations in the pharmaceutical industry, the industry as a whole, and policymakers can work together to drive sustainable supply chain management practices, reduce environmental impact, and foster social responsibility in the pharmaceutical sector.

### **7.3.3 Limitation of the study**

Based on the research scope and findings, the following limitations can be identified in this study:

1. **Limited Generalizability:** The study focuses specifically on the pharmaceutical industry in Ghana. This geographical and sector-specific focus limits the generalizability of the findings. The pharmaceutical industry in Ghana may have unique characteristics, regulatory environments, and challenges that differ from other regions and industries. Therefore, the conclusions and recommendations drawn from this study may not apply universally to other industries or geographical locations. To enhance the study's relevance, future research could consider a more diverse set of industries and global contexts.
2. **Lack of Counterarguments and Critique:** The study appears to be largely supportive of the positive impact of sustainable supply chain management (SSCM) and top management commitment (TMC). While it cites studies that corroborate its findings, it does not provide a thorough critique of the potential drawbacks or challenges associated with these concepts. To present a more balanced view, it would be beneficial to explore potential criticisms, barriers, or limitations of implementing SSCM and the role of TMC. This would provide a more comprehensive understanding of the issues at hand and offer a basis for practical recommendations that address potential challenges.

### 7.3.4 Recommendation for Future Research

Based on the conclusion and limitations of the study, here are four areas that future research should consider within academia:

1. **Long-term Impact of Sustainable Supply Chain Management:** Future studies can investigate the long-term impact of sustainable supply chain management practices on the performance outcomes of pharmaceutical companies. This research can explore the sustained benefits and competitive advantages gained from the adoption of sustainable practices, including financial performance, operational efficiency, customer satisfaction, and environmental impact.
2. **Influence of Top Management Commitment:** Further research can delve into the specific mechanisms and factors that influence top management commitment in driving sustainable supply chain management performance. This could involve examining the role of leadership styles, organizational culture, and incentives in fostering a strong commitment to sustainability. Understanding these influences can provide insights into how organizations can effectively cultivate and sustain top management commitment for long-term success.
3. **Cross-industry Comparative Analysis:** Conducting a comparative analysis across different industries can provide valuable insights into the unique challenges and opportunities of sustainable supply chain management. By comparing the pharmaceutical industry with other sectors, researchers can identify transferable best practices, learn from successful sustainability initiatives, and uncover industry-specific factors that impact sustainable performance.
4. **Policy and Regulatory Frameworks:** Further research can explore the role of policy and regulatory frameworks in promoting and facilitating sustainable supply chain management practices in the pharmaceutical industry. This could involve assessing the effectiveness of existing policies, identifying gaps and barriers to implementation, and proposing recommendations for policymakers to enhance regulatory frameworks and incentives for sustainable practices.

By investigating these areas, researchers can deepen understanding of sustainable supply chain management in the pharmaceutical industry, provide practical recommendations for organizations and policymakers, and contribute to the ongoing efforts in achieving sustainable development goals.

## Reference

Ab Hamid, MR, Sami, W & Mohmad Sidek, MH. 2017. Discriminant Validity Assessment: Use of Fornell & Larcker criterion versus HTMT Criterion. In: *Journal of Physics: Conference Series*. V. 890. Institute of Physics Publishing. 12163. doi.org/10.1088/1742-6596/890/1/012163.

Abawi, K. 2013. *Data Collection Instruments (Questionnaire & Interview). Training in Sexual and Reproductive Health Research Geneva*. Geneva.

Abdul Khalil, HPS, Davoudpour, Y, Saurabh, CK, Hossain, MS, Adnan, AS, Dungani, R, Paridah, MT, Mohamed, ZIS, et al. 2016. A review on nanocellulosic fibres as new material for sustainable packaging: Process and applications. *Renewable and Sustainable Energy Reviews*. 64. doi.org/10.1016/j.rser.2016.06.072.

Abraham, J. 2023. *Science, politics and the pharmaceutical industry: Controversy and bias in drug regulation*. Taylor & Francis. doi.org/10.4324/9781003421405.

Abutabenjeh, S & Jaradat, R. 2018. Clarification of research design, research methods, and research methodology: A guide for public administration researchers and practitioners. *Teaching Public Administration*. 36(3). doi.org/10.1177/0144739418775787.

ACC Limited. 2020. *SD 2030 plan*. Available from: <https://www.acclimited.com/sustainable/sd-2030-plan> [Accessed 3 August 2023].

Acquah, ISK, Agyabeng-Mensah, Y & Afum, E. 2021. Examining the link among green human resource management practices, green supply chain management practices and performance. *Benchmarking*. 28(1):267–290. doi.org/10.1108/BIJ-05-2020-0205.

Adam, M, Ibrahim, M, Ikramuddin & Syahputra, H. 2020. The role of digital marketing platforms on supply chain management for customer satisfaction and loyalty in small and medium enterprises (SMEs) at Indonesia. *International Journal of Supply Chain Management*. 9(3).

Adegoke, I, Mingbao, C, Abredu, P, Ndafira, GC, Amoateng, PA & Owusu-Gyan, L. 2021. Impact Of Sustainable Supply Chain Management Practices On Organizational Performance In Ghana. *Management Science and Business Decisions*. 1(2). doi.org/10.52812/msbd.32.

- Adjei-Bamfo, P, Maloreh-Nyamekye, T & Ahenkan, A. 2019. The role of e-government in sustainable public procurement in developing countries: A systematic literature review. *Resources, Conservation and Recycling*. 142:189–203. doi.org/10.1016/j.resconrec.2018.12.001.
- Adobor, H. 2012. Ethical Issues in Outsourcing: The Case of Contract Medical Research and the Global Pharmaceutical Industry. *Journal of Business Ethics*. 105(2). doi.org/10.1007/s10551-011-0964-0.
- Adzija, R & Kukhta, M. 2022. Chapter 1 – The Role of Logistics in Supply Chains. Conestoga College.
- African Union. 2021. *Treaty for the establishment of the African Medicines Agency (AMA) enters into force*.
- Afshan, N, Mandal, P, Gunasekaran, A & Motwani, J. 2022. Mediating role of immediate performance outcomes between supply chain integration and firm performance. *Asia Pacific Journal of Marketing and Logistics*. 34(4). doi.org/10.1108/APJML-11-2020-0841.
- Afthanorhan, A, Ghazali, PL & Rashid, N. 2021. Discriminant Validity: A Comparison of CBSEM and Consistent PLS using Fornell & Larcker and HTMT Approaches. In: *Journal of Physics: Conference Series*. V. 1874. doi.org/10.1088/1742-6596/1874/1/012085.
- Afum, E, Osei-Ahenkan, VY, Agyabeng-Mensah, Y, Amponsah Owusu, J, Kusi, LY & Ankomah, J. 2020. Green manufacturing practices and sustainable performance among Ghanaian manufacturing SMEs: the explanatory link of green supply chain integration. *Management of Environmental Quality: An International Journal*. 31(6). doi.org/10.1108/MEQ-01-2020-0019.
- Agarwal, P & Mishra, A. 2019. Pharmaceutical quality audits a review. *Int J Appl Pharm*. 11:14–22. doi.org/10.22159/ijap.2019v11i1.29709.
- Aghili, N, Hosseini, SE, Bin Mohammed, AH & Zainul Abidin, N. 2019. Management criteria for green building in Malaysia; relative important index. *Energy Sources, Part A: Recovery, Utilization and Environmental Effects*. 41(21):2601–2615. doi.org/10.1080/15567036.2019.1568634.

Agrawal, S, Singh, RK & Murtaza, Q. 2016. Triple bottom line performance evaluation of reverse logistics. *Competitiveness Review*. 26(3). doi.org/10.1108/CR-04-2015-0029.

Agyabeng-Mensah, Y, Afum, E & Ahenkorah, E. 2020. Exploring financial performance and green logistics management practices: Examining the mediating influences of market, environmental and social performances. *Journal of Cleaner Production*. 258. doi.org/10.1016/j.jclepro.2020.120613.

Ahmad, S, Zulkurnain, N & Khairushalimi, F. 2016. Assessing the Validity and Reliability of a Measurement Model in Structural Equation Modeling (SEM). *British Journal of Mathematics & Computer Science*. 15(3):1–8. doi.org/10.9734/bjmcs/2016/25183.

Ahmed, S, Manaf, NHA & Islam, R. 2021. Assessing top management commitment, workforce management, and quality performance of Malaysian hospitals. *International Journal of Healthcare Management*. 14(1). doi.org/10.1080/20479700.2019.1645380.

Aini Othman, A, Pandiyan Kaliani Sundram, V, Mohamed Sayuti, N & Shamsul Bahrin, A. 2016. *The Relationship between Supply Chain Integration, Just-In-Time and Logistics Performance: A Supplier's Perspective on the Automotive Industry in Malaysia*. Available from: <http://excelingtech.co.uk/> [Accessed 15 December 2022].

Al-Hakimi, MA, Al-Swidi, AK, Gelaidan, HM & Mohammed, A. 2022. The influence of green manufacturing practices on the corporate sustainable performance of SMEs under the effect of green organizational culture: A moderated mediation analysis. *Journal of Cleaner Production*. 376. doi.org/10.1016/j.jclepro.2022.134346.

Alhassan, M. 2021. Challenges Adversely Affecting the Performance of the Manufacturing Sector of Developing Countries. *SSRN Electronic Journal*. doi.org/10.2139/ssrn.3836441.

Alkaya, E & Demirer, GN. 2015. Reducing water and energy consumption in chemical industry by sustainable production approach: A pilot study for polyethylene terephthalate production. *Journal of Cleaner Production*. 99. doi.org/10.1016/j.jclepro.2015.02.087.

Alsadi, AK & Aloulou, WJ. 2021. Impacts of strategic orientations on Saudi firm performance: is supply chain integration a missing link? *International Journal of Logistics Management*. doi.org/10.1108/IJLM-02-2020-0080.

Alzoubi, HM, Ahmed, G, Al-Gasaymeh, A & Al 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). doi.org/10.5267/j.msl.2019.9.008.

Ambrogio, G, Filice, L, Longo, F & Padovano, A. 2022. Workforce and supply chain disruption as a digital and technological innovation opportunity for resilient manufacturing systems in the COVID-19 pandemic. *Computers and Industrial Engineering*. 169. doi.org/10.1016/j.cie.2022.108158.

American Production and Inventory Control Society. 2017. Supply Chain Operations Reference Model - SCOR Version 12.0. In: *Supply Chain Operations Management*.

Anand, N. 2017. *Perspectives on Various Issues of Interest: Applying the SCOR model to improve supply chain performance*. Available from: <https://www.anandnair.com/nairblog/2017/03/applying-the-scor-model-to-achieve-control-in-the-midst-of-chaos.html> [Accessed 5 August 2023].

Arsawan, IWE, Koval, V, Suhartanto, D, Babachenko, L, Kapranova, L & Suryantini, NPS. 2022. SMEs' SUPPLY CHAIN PERFORMANCE: THE ROLE OF COLLABORATION, CAPABILITIES AND INNOVATION. In: *12th International Scientific Conference "Business and Management 2022"*. doi.org/10.3846/bm.2022.788.

Arseniev, P. 2019. Sergei Tret'iakov Between Literary Positivism and the Pragmatic Turn. *Russian Literature*. 103–105:41–59. doi.org/10.1016/j.ruslit.2019.04.002.

Asamoah, D, Abor, P & Opare, M. 2011. An examination of pharmaceutical supply chain for artemisinin-based combination therapies in Ghana. *Management Research Review*. 34(7). doi.org/10.1108/01409171111146689.

Asamoah, D, Nuertey, D, Agyei-Owusu, B & Akyeh, J. 2021. The effect of supply chain responsiveness on customer development. *International Journal of Logistics Management*. 32(4). doi.org/10.1108/IJLM-03-2020-0133.

Asamoah, D, Nuertey, D, Agyei-Owusu, B & Akyeh, J. n.d. The effect of supply chain responsiveness on customer development. doi.org/10.1108/IJLM-03-2020-0133.

- Asif, K. 2022. The Impact of Procurement Strategies on Supply Chain Sustainability in the Pharmaceutical Industry. *South Asian Journal of Social Review*. 1(1):53–64. doi.org/10.57044/SAJSR.2022.1.1.2203.
- Aulakh, PK, Settanni, E & Srari, JS. 2022. Continuous manufacturing technologies in upstream pharmaceutical supply chains: Combining engineering and managerial criteria. *Journal of Multi-Criteria Decision Analysis*. 29(3–4):298–312. doi.org/10.1002/mcda.1775.
- aus der Beek, T, Weber, FA, 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). doi.org/10.1002/etc.3339.
- Awuzie, B & McDermott, P. 2017. An abductive approach to qualitative built environment research. *Qualitative Research Journal*. 17(4). doi.org/10.1108/qjrj-08-2016-0048.
- Azevedo, SG, Pimentel, CMO, Alves, AC & Matias, JCO. 2021. Support of advanced technologies in supply chain processes and sustainability impact. *Applied Sciences (Switzerland)*. 11(7). doi.org/10.3390/app11073026.
- Azungah, T. 2018. Qualitative research: deductive and inductive approaches to data analysis. *Qualitative Research Journal*. 18(4). doi.org/10.1108/QRJ-D-18-00035.
- Baah, C & Jin, Z. 2019. Sustainable Supply Chain Management and Organizational Performance: The Intermediary Role of Competitive Advantage. *Journal of Management and Sustainability*. 9(1). doi.org/10.5539/jms.v9n1p119.
- Bag, S, Wood, LC, Xu, L, Dhamija, P & Kayikci, Y. 2020. Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling*. 153. doi.org/10.1016/j.resconrec.2019.104559.
- Bai, C, Satir, A & Sarkis, J. 2019. Investing in lean manufacturing practices: an environmental and operational perspective. *International Journal of Production Research*. 57(4). doi.org/10.1080/00207543.2018.1498986.
- Balasubramanian, S & Shukla, V. 2017. Green supply chain management: an empirical investigation on the construction sector. *Supply Chain Management*. 22(1):58–81. doi.org/10.1108/SCM-07-2016-0227.

- Baliga, R, Raut, RD & Kamble, SS. 2020. Sustainable supply chain management practices and performance: An integrated perspective from a developing economy. *Management of Environmental Quality: An International Journal*. 31(5). doi.org/10.1108/MEQ-04-2019-0079.
- Bassiouni, M, Vogel, RM & Archfield, SA. 2016. Panel regressions to estimate low-flow response to rainfall variability in ungaged basins. *Water Resources Research*. 52(12). doi.org/10.1002/2016WR018718.
- Bayoud, HA. 2021. Tests of normality: new test and comparative study. *Communications in Statistics: Simulation and Computation*. 50(12). doi.org/10.1080/03610918.2019.1643883.
- Bazeley, P. 2016. Mixed or merged? Integration as the real challenge for mixed methods. *Qualitative Research in Organizations and Management: An International Journal*. 11(3):189–194. doi.org/10.1108/QROM-04-2016-1373/FULL/HTML.
- Bell, B. 2022. *BUSINESS RESEARCH Session 1a*. Available from: www.regenesys.co.za [Accessed 19 July 2022].
- Berryman, DR. 2019. Medical Reference Services Quarterly Ontology, Epistemology, Methodology, and Methods: Information for Librarian Researchers. *Taylor & Francis*. 38(3):271–279. doi.org/10.1080/02763869.2019.1623614.
- Beske, P & Seuring, S. 2014. Putting sustainability into supply chain management. *Supply Chain Management*. 19(3):322–331. doi.org/10.1108/SCM-12-2013-0432/FULL/XML.
- Beske, P, Land, A & Seuring, S. 2014. Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. *International Journal of Production Economics*. 152. doi.org/10.1016/j.ijpe.2013.12.026.
- Bhardwaj, P. 2019. Types of sampling in research. *Journal of the Practice of Cardiovascular Sciences*. 5(3). doi.org/10.4103/jpcs.jpcs\_62\_19.
- Bilgin, E. 2021. Industry 4.0 and sustainable supply chain. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi*. 43(1):123–144. doi.org/10.14780/muiibd.960306.
- Blanca, MJ, Arnau, J, López-Montiel, D, Bono, R & Bendayan, R. 2013. Skewness and kurtosis in real data samples. *Methodology*. 9(2). doi.org/10.1027/1614-2241/a000057.

- Bonett, DG & Wright, TA. 2015. Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning. *Journal of Organizational Behavior*. 36(1):3–15. doi.org/10.1002/job.1960.
- Bornman, E. 2016. Information society and digital divide in South Africa: results of longitudinal surveys. *Information Communication and Society*. 19(2). doi.org/10.1080/1369118X.2015.1065285.
- Bour, KB, Asafo, AJ & Kwarteng, BO. 2019. Study on the effects of sustainability practices on the growth of manufacturing companies in urban Ghana. *Heliyon*. 5(6). doi.org/10.1016/j.heliyon.2019.e01903.
- Boz, Z, Korhonen, V & Sand, CK. 2020. Consumer considerations for the implementation of sustainable packaging: A review. *Sustainability (Switzerland)*. 12(6). doi.org/10.3390/su12062192.
- Brandenburg, M & Rebs, T. 2015. Sustainable supply chain management: A modelling perspective. *Annals of Operations Research*. 229(1). doi.org/10.1007/s10479-015-1853-1.
- Braun, V & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 3(2). doi.org/10.1191/1478088706qp063oa.
- Braun, V & Clarke, V. 2019. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*. 11(4):589–597. doi.org/10.1080/2159676X.2019.1628806.
- Braun, V & Clarke, V. 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative research in psychology*. 18(3):328–352. doi.org/10.1080/14780887.2020.1769238.
- Breesam, HK & Kadhim Jawad, ZA. 2021. Application of the Triple Bottom Line (TBL) concept to measure the maintenance performance of buildings. *IOP Conference Series: Materials Science and Engineering*. 1090(1). doi.org/10.1088/1757-899x/1090/1/012079.
- Brink, van den S, Kleijn, R, Tukker, A & Huisman, J. 2019. Approaches to responsible sourcing in mineral supply chains. *Resources, Conservation and Recycling*. 145. doi.org/10.1016/j.resconrec.2019.02.040.

Brito, DMP & Van der Laan, EA. 2010. Supply chain management and sustainability: Procrastinating integration in mainstream research. *Sustainability*. 2(4). doi.org/10.3390/su2040859.

Bryman, A & Bell, E. 2015. *Business research methods*. USA: Oxford University Press.

Burki, U, Ersoy, P & Dahlstrom, R. 2018. Achieving triple bottom line performance in manufacturer-customer supply chains: Evidence from an emerging economy. *Journal of Cleaner Production*. 197. doi.org/10.1016/j.jclepro.2018.06.236.

Burney, SMA, & Saleem, H. 2008. *Inductive & Deductive Study Approach*. Available from: [https://scholar.google.com/scholar?hl=en&as\\_sdt=0%2C5&as\\_ylo=1900&as\\_yhi=2023&q=Burney%2C+S.M.A+and+Saleem%2C+H.+2008.+Inductive+%26+Deductive+Research+Approach.&btnG=](https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&as_ylo=1900&as_yhi=2023&q=Burney%2C+S.M.A+and+Saleem%2C+H.+2008.+Inductive+%26+Deductive+Research+Approach.&btnG=) [Accessed 11 July 2023].

Burrell, M. 1979. Burrell and Morgan 's. *Sociology The Journal Of The British Sociological Association*. 3(4).

Burrell, G & Morgan, G. 2019. Assumptions about the Nature of Social Science. In: *Sociological Paradigms and Organisational Analysis*. doi.org/10.4324/9781315609751-1.

Byrne, D. 2022. A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality and Quantity*. 56(3). doi.org/10.1007/s11135-021-01182-y.

Cai, YJ & Choi, TM. 2020. A United Nations' Sustainable Development Goals perspective for sustainable textile and apparel supply chain management. *Transportation Research Part E: Logistics and Transportation Review*. 141. doi.org/10.1016/j.tre.2020.102010.

Campbell, S, Greenwood, M, Prior, S, Shearer, T, Walkem, K, Young, S, Bywaters, D & Walker, K. 2020. Purposive sampling: complex or simple? Research case examples. *Journal of Research in Nursing*. 25(8):652–661. doi.org/10.1177/1744987120927206.

de Campos, EAR, de Paula, IC, Pagani, RN & 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*. 22(4):375–392. doi.org/10.1108/SCM-01-2017-0040/FULL/XML.

- Cangur, S & Ercan, I. 2015. Comparison of Model Fit Indices Used in Structural Equation Modeling Under Multivariate Normality. *Journal of Modern Applied Statistical Methods*. 14. doi.org/10.22237/jmasm/1430453580.
- Cao, M & Zhang, Q. 2011. Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*. 29(3). doi.org/10.1016/j.jom.2010.12.008.
- Capo, F, Brunetta, F & Boccardelli, P. 2014. Innovative business models in the pharmaceutical industry: A case on exploiting value networks to stay competitive. *International Journal of Engineering Business Management*. 6(1). doi.org/10.5772/59155.
- Caro, F, Chintapalli, P, Rajaram, K & Tang, CS. 2018. Improving supplier compliance through joint and shared audits with collective penalty. *Manufacturing and Service Operations Management*. 20(2). doi.org/10.1287/msom.2017.0653.
- Carter, CR & Easton, PL. 2011. Sustainable supply chain management: Evolution and future directions. *International Journal of Physical Distribution and Logistics Management*. 41(1). doi.org/10.1108/09600031111101420.
- Carter, CR & Rogers, DS. 2008. A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution and Logistics Management*. 38(5). doi.org/10.1108/09600030810882816.
- Carter, CR, Hatton, MR, Wu, C & Chen, X. 2020. Sustainable supply chain management: continuing evolution and future directions. *International Journal of Physical Distribution and Logistics Management*. 50(1). doi.org/10.1108/IJPDLM-02-2019-0056.
- Casteel, A & Bridier, NL. 2021. Describing populations and samples in doctoral student research. *International Journal of Doctoral Studies*. 16. doi.org/10.28945/4766.
- Castleberry, A & Nolen, A. 2018. Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching and Learning*. 10(6). doi.org/10.1016/j.cptl.2018.03.019.
- Casula, M, Rangarajan, N & Shields, P. 2021. The potential of working hypotheses for deductive exploratory research. *Quality and Quantity*. 55(5). doi.org/10.1007/s11135-020-01072-9.

- Chan, JT. 2020. SNOWBALL SAMPLING AND SAMPLE SELECTION IN A SOCIAL NETWORK. *Advances in Econometrics*. 42. doi.org/10.1108/S0731-905320200000042008.
- Chauhan, C, Kaur, P, Arrawatia, R, Ractham, P & Dhir, A. 2022. Supply chain collaboration and sustainable development goals (SDGs). Teamwork makes achieving SDGs dream work. *Journal of Business Research*. 147. doi.org/10.1016/j.jbusres.2022.03.044.
- Chen, JY. 2022. Responsible sourcing and supply chain traceability. *International Journal of Production Economics*. 248. doi.org/10.1016/j.ijpe.2022.108462.
- Chen, L & Lee, HL. 2017. Sourcing under supplier responsibility risk: The effects of certification, audit, and contingency payment. *Management Science*. 63(9):2795–2812. doi.org/10.1287/mnsc.2016.2466.
- Chen, L, Yao, S & Zhu, K. 2020. Responsible sourcing under supplier-auditor collusion. *Manufacturing and Service Operations Management*. 22(6). doi.org/10.1287/MSOM.2019.0861.
- Chen, X, Yang, H & Wang, X. 2019. Effects of price cap regulation on the pharmaceutical supply chain. *Journal of Business Research*. 97. doi.org/10.1016/j.jbusres.2018.01.030.
- Chin, TA, Tat, HH & Sulaiman, Z. 2015. Green supply chain management, environmental collaboration and sustainability performance. In: *Procedia CIRP*. V. 26. doi.org/10.1016/j.procir.2014.07.035.
- Chopra, S & Meindl, P. 2019. Supply Chain Management Strategy, Planning, and Operations. *Supply Chain Management*. 53(9).
- Christopher, M. 2016. *Logistics & supply chain management*. Available from: [https://books.google.com/books?hl=en&lr=&id=NIfQCwAAQBAJ&oi=fnd&pg=PT7&dq=Christopher,+M.+\(2016\).+Logistics+%26+supply+chain+management.+Pearson+UK.&ots=x3b0JsLqmx&sig=\\_ZZcKgAheTKOjaU74U8cEbh08Qs](https://books.google.com/books?hl=en&lr=&id=NIfQCwAAQBAJ&oi=fnd&pg=PT7&dq=Christopher,+M.+(2016).+Logistics+%26+supply+chain+management.+Pearson+UK.&ots=x3b0JsLqmx&sig=_ZZcKgAheTKOjaU74U8cEbh08Qs) [Accessed 12 August 2023].
- Chu, PH & Chang, YY. 2017. John W, Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. *Journal of Social and Administrative Sciences*. 4(June).
- Chu, SH, Yang, H, Lee, M & Park, S. 2017. The impact of institutional pressures on green supply chain management and firm performance: Top management roles and social capital. *Sustainability (Switzerland)*. 9(5). doi.org/10.3390/su9050764.

- Church, C & Crawford, A. 2020. Minerals and the metals for the energy transition: Exploring the conflict implications for mineral-rich, fragile states. In: *Lecture Notes in Energy*. V. 73. doi.org/10.1007/978-3-030-39066-2\_12.
- Clark, A. 2019. *Credit risk management principles, tools and techniques*. Available from: <https://www.theglobaltreasurer.com/2019/02/07/credit-risk-management-principles-tools-and-techniques/> [Accessed 9 June 2022].
- Clarke, E & Visser, J. 2019. Pragmatic research methodology in education: possibilities and pitfalls. *International Journal of Research & Method in Education*. 42(5):455–469. doi.org/10.1080/1743727X.2018.1524866.
- Copacino, WC. 2019. *Supply chain management: The basics and beyond*. Routledge. doi.org/10.4324/9780203737859.
- Corrêa, MP & Silva, JAF. 2016. Sustainable Supply Chain Management in Emerging Economies: Environmental Turbulence, Institutional Voids and Sustainability Trajectories. *International Journal of Production Economics*. 167:156–169. doi.org/10.19180/wems-2014-a10.
- Corry, Ulung Napitu, Wilson Simanjuntak & Bakhrul Khair Amal. 2021. Anthropological Analysis in the Perspective of Ontology, Epistemology and Axiology. *Konfrontasi: Jurnal Kultural, Ekonomi dan Perubahan Sosial*. 8(4). doi.org/10.33258/konfrontasi2.v8i4.162.
- Cox, TH & Blake, S. 1991. Managing cultural diversity: implications for organizational competitiveness. *Academy of Management Perspectives*. 5(3). doi.org/10.5465/ame.1991.4274465.
- Cresswell, JW & Plano Clark, VL. 2011. Designing and conducting mixed methods research. 2nd edn Sage Publications Inc. *Thousand Oaks, CA*. 6(2).
- Creswell, JohnW & Creswell, JD. 2018a. The Selection of a Research Approach The Three Approaches to Research. In: *Research design: Qualitative, quantitative and mixed methods approaches*.
- Creswell, JW & Creswell, JD. 2017. The Selection of a Research Approach. *Research Design*.
- Creswell, WJ & Creswell, JD. 2018b. *Research Design: Qualitative, Quantitative adn Mixed Methods Approaches*. V. 53.

Creswell, JohnW, Plano Clark, Vicki, L, Gutmann, ML & Hanson, WE. 2003. Advanced Mixed Methods Research Designs in Tashakkori, A. et Teddlie, C. (coord.). In: *Handbook of Mixed Methods in Social and Behavioral Research*.

Crick, JM & Crick, D. 2020. Coopetition and COVID-19: Collaborative business-to-business marketing strategies in a pandemic crisis. *Industrial Marketing Management*. 88. doi.org/10.1016/j.indmarman.2020.05.016.

Cristini, G, Zerbini, C & Salvietti, G. 2021. Sustainable Supply Chain Management: una review della letteratura. *Micro & Macro Marketing*.

Crossman, A. 2020. Purposive Sampling - Definition and Types. *Thoughtco*.

Crowe, S, Cresswell, K, Robertson, A, Huby, G, Avery, A & Sheikh, A. 2011. The case study approach. *BMC Medical Research Methodology*. 11. doi.org/10.1186/1471-2288-11-100.

Curry, DS. 2020. Interpretivism and norms. *Philosophical Studies*. 177(4):905–930. doi.org/10.1007/s11098-018-1212-6.

Dahlmann, F & Roehrich, JK. 2019. Sustainable supply chain management and partner engagement to manage climate change information. *Business Strategy and the Environment*. 28(8):1632–1647. doi.org/10.1002/bse.2392.

Dalenogare, LS, Benitez, GB, Ayala, NF & Frank, AG. 2018. The expected contribution of Industry 4.0 technologies for industrial performance. *International Journal of Production Economics*. 204. doi.org/10.1016/j.ijpe.2018.08.019.

Das, D. 2018. The impact of Sustainable Supply Chain Management practices on firm performance: Lessons from Indian organizations. *Journal of Cleaner Production*. 203. doi.org/10.1016/j.jclepro.2018.08.250.

Das, S & Hassan, HMK. 2022. Impact of sustainable supply chain management and customer relationship management on organizational performance. *International Journal of Productivity and Performance Management*. 71(6). doi.org/10.1108/IJPPM-08-2020-0441.

Dash, G & Paul, J. 2021. CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. *Technological Forecasting and Social Change*. 173:121092. doi.org/10.1016/j.techfore.2021.121092.

- Davis, PM. 2020. Statistics for Describing Populations. In: *Handbook of Sampling Methods for Arthropods in Agriculture*. CRC Press. 33–54. doi.org/10.1201/9781003067900-4.
- Dawadi, S, Shrestha, S & Giri, RA. 2021. Mixed-Methods Research: A Discussion on its Types, Challenges, and Criticisms. *Journal of Practical Studies in Education*. 2(2). doi.org/10.46809/jpse.v2i2.20.
- Delhi, N & Kumar Nayak Priyanka Singh, J. 2021. *S S DN P ublishers & Distributors Fundamentals of Research Methodology*. Available from: www.ssdnbooks.com [Accessed 18 October 2021].
- Denzin, NK & Lincoln, Yvonna, S. 2005. Introduction: The Discipline and Practice of Qualitative Research. *The Sage Handbook of Qualitative Research 3rd Edition*. (c).
- Depken, D & Zeman, C. 2018. Small business challenges and the triple bottom line, TBL: Needs assessment in a Midwest State, U.S.A. *Technological Forecasting and Social Change*. 135:44–50. doi.org/10.1016/J.TECHFORE.2017.05.032.
- Dhaigude, AS, Kapoor, R, Gupta, N & Padhi, SS. 2021. Linking supply chain integration to supply chain orientation and performance – a knowledge integration perspective from Indian manufacturing industries. *Journal of Knowledge Management*. 25(9). doi.org/10.1108/JKM-01-2020-0064.
- Diabat, A, & Govindan, K. 2011. An analysis of the drivers affecting the implementation of green supply chain management. *Resources, conservation and recycling*. 55(6):659–667. Available from: <https://www.sciencedirect.com/science/article/pii/S0921344910002466> [Accessed 17 October 2023].
- Diaz, JT, Contreras, AT v, Rojas, MM, Bolivar, H, Cubillos, JD v, Gonzalez, JFP & Ieee. 2015. Methodology for decisions making in transportation logistics function For Supply Chain (SC) colombian green coffee study. *2015 International Conference on Industrial Engineering And Operations Management (Ieom)*. (March).
- Díaz-Fernández, MC, González- Rodríguez, MR & Simonetti, B. 2020. Top management team diversity and high performance: An integrative approach based on upper echelons and complexity theory. *European Management Journal*. 38(1). doi.org/10.1016/j.emj.2019.06.006.

- Ding, B. 2018. Pharma Industry 4.0: Literature review and research opportunities in sustainable pharmaceutical supply chains. *Process Safety and Environmental Protection*. 119. doi.org/10.1016/j.psep.2018.06.031.
- Dominguez, R, Cannella, S, Ponte, B & Framinan, JM. 2022. Information sharing in decentralised supply chains with partial collaboration. *Flexible Services and Manufacturing Journal*. 34(2). doi.org/10.1007/s10696-021-09405-y.
- Dougherty, MR, Slevc, LR & Grand, JA. 2019. Making Research Evaluation More Transparent: Aligning Research Philosophy, Institutional Values, and Reporting. *Perspectives on Psychological Science*. 14(3):361–375. doi.org/10.1177/1745691618810693.
- Doumbia, MO, Awudu, I, Yakubu, M & Gonela, V. 2021. Pharmaceutical Supply Chain Management Practices and Organizational Performance. *International Journal of Information Systems and Supply Chain Management*. 14(4). doi.org/10.4018/ijisscm.2021100102.
- Douven, I. 2018. A Bayesian perspective on Likert scales and central tendency. *Psychonomic Bulletin and Review*. 25(3). doi.org/10.3758/s13423-017-1344-2.
- Dubey, R, Singh, T & Gupta, OK. 2015. Impact of Agility, Adaptability and Alignment on Humanitarian Logistics Performance: Mediating Effect of Leadership. *Global Business Review*. 16(5). doi.org/10.1177/0972150915591463.
- Dubey, R, Gunasekaran, A, Papadopoulos, T, Childe, SJ, Shibin, KT & Wamba, SF. 2017. Sustainable supply chain management: framework and further research directions. *Journal of Cleaner Production*. 142:1119–1130. doi.org/10.1016/j.jclepro.2016.03.117.
- Dubey, R, Altay, N, Gunasekaran, A, Blome, C, Papadopoulos, T & Childe, SJ. 2018. Supply chain agility, adaptability and alignment: Empirical evidence from the Indian auto components industry. *International Journal of Operations and Production Management*. 38(1). doi.org/10.1108/IJOPM-04-2016-0173.
- Dubey, R, Gunasekaran, A, Childe, SJ, Papadopoulos, T, Hazen, BT & Roubaud, D. 2018. Examining top management commitment to TQM diffusion using institutional and upper echelon theories. *International Journal of Production Research*. 56(8). doi.org/10.1080/00207543.2017.1394590.

- Dubois, A & Gadde, LE. 2002. Systematic combining: An abductive approach to case research. *Journal of Business Research*. 55(7). doi.org/10.1016/S0148-2963(00)00195-8.
- Duffett, R & Wakeham, M. 2023. Modeling a New Supplier Preference Paradigm: A Business-to-Business and African Developing Economy Context. *Sustainability (Switzerland)*. 15(1). doi.org/10.3390/su15010411.
- Dźwigoł, H. 2020. Pilot study in the research procedure. *Organization & Management Scientific Quartely*. 2020(50). doi.org/10.29119/1899-6116.2020.50.1.
- Earl Rinehart, K. 2021. Abductive Analysis in Qualitative Inquiry. *Qualitative Inquiry*. 27(2). doi.org/10.1177/1077800420935912.
- Egels-Zandén, N. 2014. Revisiting Supplier Compliance with MNC Codes of Conduct: Recoupling Policy and Practice at Chinese Toy Suppliers. *Journal of Business Ethics*. 119(1). doi.org/10.1007/s10551-013-1622-5.
- Eisenhardt, KM & Graebner, ME. 2007. Theory Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25–32. building from cases: Opportunities and challenges. *Academy of Management Journal*.
- Elkington, J. 1997. The triple bottom line. *Environmental management: Readings and cases*. 2:49–66. Available from: [https://books.google.com/books?hl=en&lr=&id=hRJGrsGnMXcC&oi=fnd&pg=PA49&dq=Elkington,+J.+\(1997\).+The+triple+bottom+line.+Environmental+management:+Readings+and+cases,+2,+49-66.&ots=0ftDBLMqcI&sig=wkm5fGweAtfskbl38leUnZ-7694](https://books.google.com/books?hl=en&lr=&id=hRJGrsGnMXcC&oi=fnd&pg=PA49&dq=Elkington,+J.+(1997).+The+triple+bottom+line.+Environmental+management:+Readings+and+cases,+2,+49-66.&ots=0ftDBLMqcI&sig=wkm5fGweAtfskbl38leUnZ-7694) [Accessed 13 October 2023].
- Esfahbodi, A, Zhang, Y & Watson, G. 2016. Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. *International Journal of Production Economics*. 181:350–366. doi.org/10.1016/j.ijpe.2016.02.013.
- Etikan, I. 2016. Comparision of Snowball Sampling and Sequential Sampling Technique. *Biometrics & Biostatistics International Journal*. 3(1). doi.org/10.15406/bbij.2016.03.00055.

- Fakir, ANMA & Jusoh, R. 2020. Board gender diversity and corporate sustainability performance: Mediating role of enterprise risk management. *Journal of Asian Finance, Economics and Business*. 7(6). doi.org/10.13106/JAFEB.2020.VOL7.NO6.351.
- Falakh, F & Setiani, O. 2018. Hazard Identification and Risk Assessment in Water Treatment Plant considering Environmental Health and Safety Practice. In: *E3S Web of Conferences*. V. 31. doi.org/10.1051/e3sconf/20183106011.
- Ferraz De Campos, JJ. 2017. The Triple Bottom Line and the Systemic Approach. doi.org/10.13140/RG.2.2.17357.33764.
- Flick, U. 2018. *Doing triangulation and mixed methods*. Available from: [https://books.google.com/books?hl=en&lr=&id=GQJbDwAAQBAJ&oi=fnd&pg=PP1&dq=triangulation+in+qualitative+research+&ots=SdIxL3ZFmO&sig=TBqhTM8tZkJ4w8rN\\_b11LYFUgE0](https://books.google.com/books?hl=en&lr=&id=GQJbDwAAQBAJ&oi=fnd&pg=PP1&dq=triangulation+in+qualitative+research+&ots=SdIxL3ZFmO&sig=TBqhTM8tZkJ4w8rN_b11LYFUgE0) [Accessed 17 December 2021].
- Florescu, MS, Ceptureanu, EG, Cruceru, AF & Ceptureanu, SI. 2019. Sustainable supply chain management strategy influence on supply chain management functions in the oil and gas distribution industry. *Energies*. 12(9). doi.org/10.3390/en12091632.
- Forehand, K, Román, J & Schaefer, T. 2021. Supply chain efficiency in the discount store industry post covid-19: Applying the supply chain efficiency ratio. *Operations and Supply Chain Management*. 14(4). doi.org/10.31387/oscm0470313.
- Formentini, M & Taticchi, P. 2016. Corporate sustainability approaches and governance mechanisms in sustainable supply chain management. *Journal of Cleaner Production*. 112. doi.org/10.1016/j.jclepro.2014.12.072.
- Fritz, MC. 2019. Sustainable Supply Chain Management Related papers. *academia.edu*. doi.org/10.1007/978-3-319-71062-4\_21-1.
- Futri, IN, Risfandy, T & Ibrahim, MH. 2022. Quota sampling method in online household surveys. *MethodsX*. 9. doi.org/10.1016/j.mex.2022.101877.
- Ganesh, N, Pineau, V & Chakraborty, A. 2017. Combining Probability and Non-Probability Samples Using Small Area Estimation. *Joint Statistical Meetings 2017 Proceedings*. (2009).

- Ganguly, A & Kumar, C. 2019. Evaluating supply chain resiliency strategies in the Indian pharmaceutical sector: A Fuzzy Analytic Hierarchy Process (F-AHP) approach. *International Journal of the Analytic Hierarchy Process*. 11(2). doi.org/10.13033/ijahp.v11i2.620.
- Gigliotti, M, Schmidt-Traub, G & Bastianoni, S. 2018. The sustainable development goals. In: *Encyclopedia of Ecology*. doi.org/10.1016/B978-0-12-409548-9.10986-8.
- Gimenez, C, Sierra, V & Rodon, J. 2012. Sustainable operations: Their impact on the triple bottom line. *International Journal of Production Economics*. 140(1). doi.org/10.1016/j.ijpe.2012.01.035.
- Glick, D. 2021. Pluralist structural realism: The best of both worlds? *Synthese*. 198(5):4145–4166. doi.org/10.1007/s11229-019-02333-3.
- Goertz, G & Mahoney, J. 2012. Concepts and measurement: Ontology and epistemology. *Social Science Information*. 51(2):205–216. doi.org/10.1177/0539018412437108.
- Govindan, K. 2018. Sustainable consumption and production in the food supply chain: A conceptual framework. *International Journal of Production Economics*. 195. doi.org/10.1016/j.ijpe.2017.03.003.
- Guest, G, MacQueen, K & Namey, E. 2014. Validity and Reliability (Credibility and Dependability) in Qualitative Research and Data Analysis. In: *Applied Thematic Analysis*. doi.org/10.4135/9781483384436.n4.
- Gupta, H. 2020. A detailed analysis of probability & non-probability sampling techniques for business research. *International Journal of Advanced Science and Technology*. 29(4 Special Issue).
- Gurtu, A & Johny, J. 2021. Supply Chain Risk Management: Literature Review. *Risks*. 9(1):16. doi.org/10.3390/risks9010016.
- Habib, MA, Bao, Y, Nabi, N, Dulal, M, Asha, AA & Islam, M. 2021. Impact of strategic orientations on the implementation of green supply chain management practices and sustainable firm performance. *Sustainability (Switzerland)*. 13(1). doi.org/10.3390/su13010340.
- Hair, JF, Hult, GTM, Ringle, CM & Sarstedt, M. 2017. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Second Edition.

Hair, JF, Page, M & Brunsveld, N. 2019. *Essentials of Business Research Methods*. Routledge. doi.org/10.4324/9780429203374.

Hair Jr., JF, Matthews, LM, Matthews, RL & Sarstedt, M. 2017. PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*. 1(2). doi.org/10.1504/ijmda.2017.10008574.

Hambrick, DC. 2018. Upper Echelons Theory. In: *The Palgrave Encyclopedia of Strategic Management*. Palgrave Macmillan UK. 1782–1785. doi.org/10.1057/978-1-137-00772-8\_785.

Hambrick, DC & Mason, PA. 1984. Upper Echelons: The Organization as a Reflection of Its Top Managers. *Academy of Management Review*. 9(2). doi.org/10.5465/amr.1984.4277628.

Hammersley, M. 2019. From Positivism to Post-Positivism: Progress or Digression? *Teoria Polityki*. 3:175–188. doi.org/10.4467/25440845tp.19.009.10292.

Handfield, R & Nichols, J EL. 1999. *Introduction to Supply Chain Management*. Available from:

[https://ncseagrant.ncsu.edu/ncseagrant\\_docs/events/seafood\\_workshop/2009/sfmarketing09\\_handfield.pdf](https://ncseagrant.ncsu.edu/ncseagrant_docs/events/seafood_workshop/2009/sfmarketing09_handfield.pdf) [Accessed 1 November 2023].

Handfield, R, Jeong, S & Choi, T. 2019. Emerging procurement technology: data analytics and cognitive analytics. *International Journal of Physical Distribution and Logistics Management*. 49(10). doi.org/10.1108/IJPDLM-11-2017-0348.

Hani, JSB. 2021. The moderating role of lean operations between supply chain integration and operational performance in Saudi manufacturing organizations. *Uncertain Supply Chain Management*. 9(1). doi.org/10.5267/j.uscm.2020.10.004.

Harvard Catalyst. 2023. *Basic Mixed Methods Research Designs*. Available from: [https://catalyst.harvard.edu/community-engagement/mmr/hcat\\_mmr\\_sm-6090567e0f943-60905896c80af-60e5fdbbc2399e-60e5fdd8057fc-610bf777da6a0-610bf7808de24-610bf792228a4-610bf8685d8f5-610bf871cbea9/](https://catalyst.harvard.edu/community-engagement/mmr/hcat_mmr_sm-6090567e0f943-60905896c80af-60e5fdbbc2399e-60e5fdd8057fc-610bf777da6a0-610bf7808de24-610bf792228a4-610bf8685d8f5-610bf871cbea9/) [Accessed 6 October 2023].

Hatti-Kaul, R, Nilsson, L, Zhang, B & Rehnberg, N. 2020. Designing biobased recyclable polymers for plastics. *Trends in biotechnology*. 38(1):50–57. Available from: [https://www.cell.com/trends/biotechnology/fulltext/S0167-7799\(19\)30089-7](https://www.cell.com/trends/biotechnology/fulltext/S0167-7799(19)30089-7) [Accessed 25 October 2023].

- Hedima, EW, Adeyemi, MS & Ikunaiye, NY. 2020. Community pharmacists: On the frontline of health service against COVID-19 in LMICs. *Research in Social and Administrative Pharmacy*. 17(1):1964–1966. doi.org/10.1016/j.sapharm.2020.04.017.
- Hennink, M & Kaiser, BN. 2022. Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science and Medicine*. 292. doi.org/10.1016/j.socscimed.2021.114523.
- Henseler, J, Ringle, CM & Sarstedt, M. 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*. 43(1). doi.org/10.1007/s11747-014-0403-8.
- Hermano, V & Martín-Cruz, N. 2016. The role of top management involvement in firms performing projects: A dynamic capabilities approach. *Journal of Business Research*. 69(9). doi.org/10.1016/j.jbusres.2016.01.041.
- Hill, C. 2022. *Benefits of the Triple Bottom Line*. Available from: <https://www.myassignmentservices.com/blog/benefits-of-the-triple-bottom-line> [Accessed 3 August 2023].
- Hobbs, JE. 2020. Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics*. 68(2):171–176. doi.org/10.1111/cjag.12237.
- Hoffman, D & Bowditch, A. 2020. *The Global Pharmaceutical Industry*. Routledge. doi.org/10.4324/9781003053781.
- Hong, J, Zhang, Y & Ding, M. 2018. Sustainable supply chain management practices, supply chain dynamic capabilities, and enterprise performance. *Journal of Cleaner Production*. 172:3508–3519. doi.org/10.1016/j.jclepro.2017.06.093.
- Howse, R. 2016. The world trade organization 20 years on: Global governance by judiciary. *European Journal of International Law*. 27(1). doi.org/10.1093/ejil/chw011.
- Hsu, HY, Hwang, MH & Chiu, YSP. 2021. Development of a strategic framework for sustainable supply chain management. *AIMS Environmental Science*. 8(6). doi.org/10.3934/ENVIRONSCI.2021034.
- Hunter, S & Waterman, RW. 2016. *Enforcing the Law: Case of the Clean Water Acts*. doi.org/10.4324/9781315285696.

- Huq, F, Pawar, KS & Rogers, H. 2016. Supply chain configuration conundrum: how does the pharmaceutical industry mitigate disturbance factors? *Production Planning and Control*. 27(14). doi.org/10.1080/09537287.2016.1193911.
- Hurley, E, Dietrich, T & Rundle-Thiele, S. 2021. Integrating Theory in Co-design: An Abductive Approach. *Australasian Marketing Journal*. 29(1). doi.org/10.1177/1839334921998541.
- Hussain, K, Ambreen, G, Muzammil, M, Raza, SS & Ali, U. 2020. doi.org/10.1186/s40545-020-00277-5.
- Iakovou, E, Bochtis, D, Vlachos, D & Aidonis, D. 2015. Sustainable agrifood supply chain management. In: *Supply Chain Management for Sustainable Food Networks*. doi.org/10.1002/9781118937495.ch1.
- Ibrahim, ID, Hamam, Y, Sadiku, ER, Ndambuki, JM, Kupolati, WK, Jamiru, T, Eze, AA & Snyman, J. 2022. doi.org/10.3390/polym14204430.
- IFPMA. 2023. *Innovating to improve health worldwide - International Federation of Pharmaceutical Manufacturers & Associations*. Available from: <https://www.ifpma.org/> [Accessed 7 September 2023].
- Iglesias, O, Markovic, S, Bagherzadeh, M & Singh, JJ. 2020. Co-creation: A Key Link Between Corporate Social Responsibility, Customer Trust, and Customer Loyalty. *Journal of Business Ethics*. 163(1). doi.org/10.1007/s10551-018-4015-y.
- Iliyasu, R & Etikan, I. 2021. Comparison of quota sampling and stratified random sampling. *Biometrics & Biostatistics International Journal*. 10(1). doi.org/10.15406/bbij.2021.10.00326.
- Ilyas, S, Hu, Z & Wiwattanakornwong, K. 2020. Unleashing the role of top management and government support in green supply chain management and sustainable development goals. *Environmental Science and Pollution Research*. 27(8). doi.org/10.1007/s11356-019-07268-3.
- Islam, MA, Deegan, C & Gray, R. 2018. Social compliance audits and multinational corporation supply chain: evidence from a study of the rituals of social audits. *Accounting and Business Research*. 48(2). doi.org/10.1080/00014788.2017.1362330.

- Islam, MH, Sarker, R, Hossain, I, Ali, K & Noor, KMA. 2020. Towards Sustainable Supply Chain Management (SSCM): A Case of Leather Industry. *Journal of Operations and Strategic Planning*. 3(1):81–98. doi.org/10.1177/2516600X20924313.
- Isnaini, DBY, Nurhaida, T & Pratama, I. 2020. Moderating effect of supply chain dynamic capabilities on the relationship of sustainable supply chain management practices and organizational sustainable performance: A study on the restaurant industry in Indonesia. *International Journal of Supply Chain Management*. 9(1).
- Ivankova, NV, Creswell, JW & Stick, SL. 2006. Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice Citations at UCLA COLLEGE SERIALS/YRL on. *journals.sagepub.com*. 18(1).
- Jabbour, CJC & De Sousa Jabbour, ABL. 2016. Green Human Resource Management and Green Supply Chain Management: Linking two emerging agendas. *Journal of Cleaner Production*. 112. doi.org/10.1016/j.jclepro.2015.01.052.
- Jaberidoost, M, Nikfar, S, Abdollahiasl, A & Dinarvand, R. 2013. Pharmaceutical supply chain risks: A systematic review. *DARU, Journal of Pharmaceutical Sciences*. 21(1):1–7. doi.org/10.1186/2008-2231-21-69/TABLES/1.
- Jadon, K. 2015. *Primary and Secondary Data*. McMaster University.
- Jain, V, Kumar, S, Mostofi, A & Arab Momeni, M. 2022. Sustainability performance evaluation of the E-waste closed-loop supply chain with the SCOR model. *Waste Management*. 147. doi.org/10.1016/j.wasman.2022.05.010.
- Jalundhwala, F & Londhe, V. 2023. A systematic review on implementing operational excellence as a strategy to ensure regulatory compliance: a roadmap for Indian pharmaceutical industry. *International Journal of Lean Six Sigma*. 14(4):730–758. doi.org/10.1108/IJLSS-04-2022-0078/FULL/XML.
- Jia, P, Diabat, A & Mathiyazhagan, K. 2015. Analyzing the SSCM practices in the mining and mineral industry by ISM approach. *Resources Policy*. 46. doi.org/10.1016/j.resourpol.2014.04.004.
- Jilcha Sileyew, K. 2020. Research Design and Methodology. In: *Cyberspace*. IntechOpen. doi.org/10.5772/intechopen.85731.

- Karuppiah, K, Sankaranarayanan, B, Ali, SM & Paul, SK. 2021. Key challenges to sustainable humanitarian supply chains: Lessons from the covid-19 pandemic. *Sustainability (Switzerland)*. 13(11). doi.org/10.3390/su13115850.
- Kauppi, K, Salmi, A & You, W. 2018. Sourcing from Africa: A Systematic Review and a Research Agenda. *International Journal of Management Reviews*. 20(2). doi.org/10.1111/ijmr.12158.
- Kaur, A, Kumar, A & Luthra, S. 2022. Business continuity through customer engagement in sustainable supply chain management: outlining the enablers to manage disruption. *Environmental Science and Pollution Research*. 29(10). doi.org/10.1007/s11356-021-16683-4.
- Kaushik, V & Walsh, CA. 2019. Pragmatism as a research paradigm and its implications for Social Work research. *Social Sciences*. 8(9). doi.org/10.3390/socsci8090255.
- Kayikci, Y, Kazancoglu, Y, Gozacan-Chase, N & Lafci, C. 2022. Analyzing the drivers of smart sustainable circular supply chain for sustainable development goals through stakeholder theory. *Business Strategy and the Environment*. 31(7). doi.org/10.1002/bse.3087.
- Kenny, DA, Kaniskan, B & McCoach, DB. 2015. The Performance of RMSEA in Models With Small Degrees of Freedom. *Sociological Methods & Research*. 44(3):486–507. doi.org/10.1177/0049124114543236.
- Khan, A, Chen, CC, Lu, KH, Wibowo, A, Chen, SC & Ruangkanjanases, A. 2021. Supply chain ambidexterity and green scm: Moderating role of network capabilities. *Sustainability (Switzerland)*. 13(11). doi.org/10.3390/su13115974.
- Khatri, KK. 2020. Research Paradigm: A Philosophy of Educational Research. *International Journal of English Literature and Social Sciences*. 5(5):1435–1440. doi.org/10.22161/ijels.55.15.
- Kiel, D, Müller, JM, Arnold, C & Voigt, KI. 2017. Sustainable industrial value creation: Benefits and challenges of industry 4.0. *International Journal of Innovation Management*. 21(8). doi.org/10.1142/S1363919617400151.
- Kiger, ME & Varpio, L. 2020. Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical Teacher*. 42(8). doi.org/10.1080/0142159X.2020.1755030.

- Kim, J. 2021. Extending upper echelon theory to top managers' characteristics, management practice, and quality of public service in local government. *Local Government Studies*. doi.org/10.1080/03003930.2021.1882427.
- Kim, S & Chae, S. 2022. Shareholder Value Effects of Ethical Sourcing: Comparing Reactive and Proactive Initiatives. *Journal of Business Ethics*. 179(3). doi.org/10.1007/s10551-021-04841-0.
- Kitsis, AM & Chen, IJ. 2021. Do stakeholder pressures influence green supply chain Practices? Exploring the mediating role of top management commitment. *Journal of Cleaner Production*. 316. doi.org/10.1016/j.jclepro.2021.128258.
- Klassen, RD & Vereecke, A. 2012. Social issues in supply chains: Capabilities link responsibility, risk (opportunity), and performance. *International Journal of Production Economics*. 140(1):103–115. doi.org/10.1016/J.IJPE.2012.01.021.
- Klein, RB. 2016. Principles and Practice of Structural Equation Modeling, Fourth Edition. *The Guilford Press*. 8(5).
- Klemeš, JJ, Fan, Y Van, Tan, RR & Jiang, P. 2020. Minimising the present and future plastic waste, energy and environmental footprints related to COVID-19. *Renewable and Sustainable Energy Reviews*. 127. doi.org/10.1016/j.rser.2020.109883.
- Kohler, U. 2019. Possible uses of nonprobability sampling for the social sciences. *Survey Methods: Insights from the Field*. 1–12. doi.org/10.13094/SMIF-2019-00014.
- Komlaga, G, Agyare, C, Dickson, RA, Mensah, MLK, Annan, K, Loiseau, PM & Champy, P. 2015. Medicinal plants and finished marketed herbal products used in the treatment of malaria in the Ashanti region, Ghana. *Journal of Ethnopharmacology*. 172. doi.org/10.1016/j.jep.2015.06.041.
- Kuwornu, JKM, Khaipetch, J, Gunawan, E, Bannor, RK & Ho, TDN. 2023. The adoption of sustainable supply chain management practices on performance and quality assurance of food companies. *Sustainable Futures*. 5. doi.org/10.1016/j.sftr.2022.100103.
- Kwak, SG & Park, S-H. 2019. Normality Test in Clinical Research. *Journal of Rheumatic Diseases*. 26(1). doi.org/10.4078/jrd.2019.26.1.5.

- Lai, K & Green, SB. 2016. The Problem with Having Two Watches: Assessment of Fit When RMSEA and CFI Disagree. *Taylor & Francis*. 51(2–3):220–239. doi.org/10.1080/00273171.2015.1134306.
- Lamb, J. 2019. Realism. In: *The Routledge Handbook of Reenactment Studies: Key Terms in the Field*. doi.org/10.4324/9780429445637-42.
- Langevin, MS. 2023. Trade Clashes and the Uruguay Round. In: *International Political Economy Series*. V. Part F1. doi.org/10.1007/978-3-031-34264-6\_3.
- Langley, C, Novack, R, Gibson, B & Coyle, J. 2020. *Supply chain management: a logistics perspective*. Available from: [https://books.google.com/books?hl=en&lr=&id=3Gf6DwAAQBAJ&oi=fnd&pg=PP1&dq=Logistics+function+in+Supply+chain&ots=Iyg\\_Zq-Pi6&sig=EJZ2iIrbj2by1jmQ00YXdGpP7-o](https://books.google.com/books?hl=en&lr=&id=3Gf6DwAAQBAJ&oi=fnd&pg=PP1&dq=Logistics+function+in+Supply+chain&ots=Iyg_Zq-Pi6&sig=EJZ2iIrbj2by1jmQ00YXdGpP7-o) [Accessed 25 January 2022].
- Lartey, PA, Graham, AE, Lukulay, PH & Ndomondo-Sigonda, M. 2018. Pharmaceutical Sector Development in Africa: Progress to Date. *Pharmaceutical Medicine*. 32(1). doi.org/10.1007/s40290-018-0220-3.
- Laszlo, E. 2021. *Introduction to systems philosophy: Toward a new paradigm of contemporary thought*. Available from: <https://www.taylorfrancis.com/books/mono/10.4324/9781003205586/introduction-systems-philosophy-ervin-laszlo> [Accessed 3 January 2023].
- Latapí Agudelo, MA, Jóhannsdóttir, L & Davídsdóttir, B. 2019. A literature review of the history and evolution of corporate social responsibility. *International Journal of Corporate Social Responsibility*. 4(1):1. doi.org/10.1186/s40991-018-0039-y.
- Lee, AS. 2020. Commentary on “demystifying the influential is legends of positivism”. *Journal of the Association for Information Systems*. 21(4):836–842. doi.org/10.17705/1jais.00621.
- Lee, C & Ha, BC. 2021. Interactional justice, informational quality, and sustainable supply chain management: A comparison of domestic and multinational pharmaceutical companies. *Sustainability (Switzerland)*. 13(2). doi.org/10.3390/su13020998.

- Lee, KH, Park, BJ, Song, H & Yook, KH. 2017. The Value Relevance of Environmental Audits: Evidence from Japan. *Business Strategy and the Environment*. 26(5). doi.org/10.1002/bse.1940.
- Leeuw, E De, Hox, J & Dillman, D. 2012. *International handbook of survey methodology*. Available from: <https://api.taylorfrancis.com/content/books/mono/download?identifierName=doi&identifierValue=10.4324/9780203843123&type=googlepdf> [Accessed 18 October 2023].
- Leguina, A. 2015. A primer on partial least squares structural equation modeling (PLS-SEM). *International Journal of Research & Method in Education*. 38(2). doi.org/10.1080/1743727x.2015.1005806.
- LeMay, S, Helms, MM, Kimball, B & McMahon, D. 2017. Supply chain management: The elusive concept & definition. *International Journal of Logistics Management*. 28(4):1425–1453. doi.org/10.1108/IJLM-10-2016-0232.
- Lenzer, G. 2017. *Auguste comte and positivism: The essential writings*. Routledge. doi.org/10.4324/9781351315289.
- Li, L, Su, Q & Chen, X. 2011. Ensuring supply chain quality performance through applying the SCOR model. *International Journal of Production Research*. 49(1). doi.org/10.1080/00207543.2010.508934.
- Liang, X. 2020. Prior Sensitivity in Bayesian Structural Equation Modeling for Sparse Factor Loading Structures. *Educational and Psychological Measurement*. 80(6). doi.org/10.1177/0013164420906449.
- Liang, X, Zhao, X, Wang, M & Li, Z. 2018. Small and Medium-Sized Enterprises Sustainable Supply Chain Financing Decision Based on Triple Bottom Line Theory. *Sustainability* 2018, Vol. 10, Page 4242. 10(11):4242. doi.org/10.3390/SU10114242.
- Littlewood, D & Holt, D. 2018. How social enterprises can contribute to the sustainable development goals (SDGs) - A conceptual framework. In: *Contemporary Issues in Entrepreneurship Research*. V. 8. doi.org/10.1108/S2040-724620180000008007.

- Liu, L, Song, W & Liu, Y. 2023. Leveraging digital capabilities toward a circular economy: Reinforcing sustainable supply chain management with Industry 4.0 technologies. *Computers and Industrial Engineering*. 178. doi.org/10.1016/j.cie.2023.109113.
- Liu, S, Eweje, G, He, Q & Lin, Z. 2020. Turning motivation into action: A strategic orientation model for green supply chain management. *Business Strategy and the Environment*. 29(7). doi.org/10.1002/bse.2580.
- Lohr, SL. 2019. *Sampling*. Chapman and Hall. doi.org/10.1201/9780429296284.
- Low, J. 2019. A Pragmatic Definition of the Concept of Theoretical Saturation. *Sociological Focus*. 52(2):131–139. doi.org/10.1080/00380237.2018.1544514.
- Lücker, F & Seifert, RW. 2017. Building up Resilience in a Pharmaceutical Supply Chain through Inventory, Dual Sourcing and Agility Capacity. *Omega (United Kingdom)*. 73. doi.org/10.1016/j.omega.2017.01.001.
- MacChi, C. 2021. A Glass Half Full: Critical Assessment of EU Regulation 2017/821 on Conflict Minerals. *Journal of Human Rights Practice*. 13(2). doi.org/10.1093/jhuman/huab027.
- Madu, O. 2023. *Sustainable Supply Chain Development in Africa*. Available from: <https://smartprocurement.co.za/sustainable-supply-chain-development-in-africa/> [Accessed 11 September 2023].
- Magallón, N. 2020. Trade in minerals and human rights: towards responsible sourcing of minerals from conflict areas in Europe (REGULATION (EU) 2017/821). *Spanish Yearbook of International Law*. 24. doi.org/10.17103/sybil.24.7.
- Mangan, J & Lalwani, C. 2016. *Global logistics and supply chain management*. Available from: <https://books.google.com/books?hl=en&lr=&id=5BsWCgAAQBAJ&oi=fnd&pg=PA9&dq=Logistics+function+in+Supply+chain&ots=9d4BhuE9o0&sig=ityNnUpBGJvgqgb7xDsT9Oycy-A> [Accessed 25 January 2022].
- Marsh, HW, Hau, KT & Grayson, D. 2013. Goodness of fit in structural equation models. In: *Contemporary Psychometrics: A Festschrift for Roderick P.McDonald*. doi.org/10.4324/9781410612977.

- Martínez-Mesa, J, González-Chica, DA, Duquia, RP, Bonamigo, RR & Bastos, JL. 2016. Sampling: How to select participants in my research study? *Anais Brasileiros de Dermatologia*. 91(3). doi.org/10.1590/abd1806-4841.20165254.
- De Martini, F. 2021. Supply chains and disruptive events: an inventory management system perspective. (July, 13). Available from: <http://dspace.unive.it/handle/10579/19897> [Accessed 12 September 2023].
- Mason, M. 2010. Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung*. 11(3).
- Mavengere, NB. 2013. Information technology role in supply chain's strategic agility. *International Journal of Agile Systems and Management*. 6(1):7–24. doi.org/10.1504/IJASM.2013.052209.
- McCrudden, MT & McTigue, EM. 2019. Implementing Integration in an Explanatory Sequential Mixed Methods Study of Belief Bias About Climate Change With High School Students. *Journal of Mixed Methods Research*. 13(3). doi.org/10.1177/1558689818762576.
- McKenna, E & Hamington, M. 2021. Pragmatism. In: *The Oxford Handbook of Feminist Philosophy*. doi.org/10.1093/oxfordhb/9780190628925.013.7.
- Meherishi, L, Narayana, SA & Ranjani, KS. 2019. Sustainable packaging for supply chain management in the circular economy: A review. *Journal of Cleaner Production*. 237. doi.org/10.1016/j.jclepro.2019.07.057.
- Mehralian, G, Zarenezhad, F & Ghatari, AR. 2015. Developing a model for an agile supply chain in pharmaceutical industry. *International Journal of Pharmaceutical and Healthcare Marketing*. 9(1). doi.org/10.1108/IJPHM-09-2013-0050.
- Mehralian, G, Nazari, JA, Zarei, L & Rasekh, HR. 2016. The effects of corporate social responsibility on organizational performance in the Iranian pharmaceutical industry: The mediating role of TQM. *Journal of Cleaner Production*. 135. doi.org/10.1016/j.jclepro.2016.06.116.
- Menon, RR & Ravi, V. 2021. Analysis of enablers of sustainable supply chain management in electronics industries: The Indian context. *Cleaner Engineering and Technology*. 5. doi.org/10.1016/j.clet.2021.100302.

- Miao, K, Su, L & Wang, W. 2020. Panel threshold regressions with latent group structures. *Journal of Econometrics*. 214(2). doi.org/10.1016/j.jeconom.2019.07.006.
- Miller, CJ, Smith, SN & Pugatch, M. 2020. Experimental and quasi-experimental designs in implementation research. *Psychiatry Research*. 283. doi.org/10.1016/j.psychres.2019.06.027.
- Mkansi, M & Acheampong, EA. 2012. Research philosophy debates and classifications: Students' dilemma. *Electronic Journal of Business Research Methods*. 10(2).
- Mohamad, MM, Sulaiman, NL, Sern, LC & Salleh, KM. 2015. Measuring the Validity and Reliability of Research Instruments. *Procedia - Social and Behavioral Sciences*. 204:164–171. doi.org/10.1016/j.sbspro.2015.08.129.
- Moosivand, A, Ghatari, AR & Rasekh, HR. 2019. Supply chain challenges in pharmaceutical manufacturing companies: Using qualitative system dynamics methodology. *Iranian Journal of Pharmaceutical Research*. 18(2):1103–1116. doi.org/10.22037/ijpr.2019.2389.
- Morashti, JA, An, Y & Jang, H. 2022. A Systematic Literature Review of Sustainable Packaging in Supply Chain Management. *Sustainability (Switzerland)*. 14(9). doi.org/10.3390/su14094921.
- Morgan, G. 2012. Paradigm diversity in organizational research. In: *The Theory and Philosophy of Organizations: Critical Issues and New Perspectives*. doi.org/10.4324/9780203059937.
- Mousazadeh, M, Torabi, SA & Zahiri, B. 2015. A robust possibilistic programming approach for pharmaceutical supply chain network design. *Computers and Chemical Engineering*. 82. doi.org/10.1016/j.compchemeng.2015.06.008.
- Moyo, T. 2017. Data collection instruments in research: An ontological and epistemological reflection. *Journal of Public Administration*. 52(1).
- Muhaise, H, Ejiri, A, Muwanga, H, Zake, F & Kareyo, M. 2020. The Research Philosophy Dilemma for Postgraduate Student Researchers. *International Journal of Research and Scientific Innovation (IJRSI) |*. VII(IV).
- Mukhamedjanova, KA. 2020. Concept of supply chain management. *Journal of Critical Reviews*. 7(2). doi.org/10.31838/jcr.07.02.139.

Muñoz-Pascual, L, Curado, C & Galende, J. 2019. The Triple Bottom Line on Sustainable Product Innovation Performance in SMEs: A Mixed Methods Approach. *Sustainability* 2019, Vol. 11, Page 1689. 11(6):1689. doi.org/10.3390/SU11061689.

Muñoz-Torres, MJ, Fernández-Izquierdo, M ángeles, Rivera-Lirio, JM, Ferrero-Ferrero, I, Escrig-Olmedo, E, Gisbert-Navarro, JV & Marullo, MC. 2018. An assessment tool to integrate sustainability principles into the global supply chain. *Sustainability (Switzerland)*. 10(2). doi.org/10.3390/su10020535.

Muñoz-Torres, MJ, Fernández-Izquierdo, MÁ, Rivera-Lirio, JM, Ferrero-Ferrero, I & Escrig-Olmedo, E. 2020. Sustainable supply chain management in a global context: a consistency analysis in the textile industry between environmental management practices at company level and sectoral and global environmental challenges. *Environment, Development and Sustainability*. doi.org/10.1007/s10668-020-00748-4.

Muñoz-Torres, MJ, Fernández-Izquierdo, MÁ, Rivera-Lirio, JM, Ferrero-Ferrero, I & Escrig-Olmedo, E. 2021a. Sustainable supply chain management in a global context: a consistency analysis in the textile industry between environmental management practices at company level and sectoral and global environmental challenges. *Environment, Development and Sustainability*. 23(3):3883–3916. doi.org/10.1007/s10668-020-00748-4.

Muñoz-Torres, MJ, Fernández-Izquierdo, MÁ, Rivera-Lirio, JM, Ferrero-Ferrero, I & Escrig-Olmedo, E. 2021b. Sustainable supply chain management in a global context: a consistency analysis in the textile industry between environmental management practices at company level and sectoral and global environmental challenges. *Environment, Development and Sustainability*. 23(3). doi.org/10.1007/s10668-020-00748-4.

Murray, K. 2022. *How Sustainable is the Pharma Industry? | CPI*. Available from: <https://www.uk-cpi.com/blog/the-future-of-the-pharma-industry-can-be-sustainable> [Accessed 27 October 2022].

Mwangi, GM, Despoudi, S, Espindola, OR, Spanaki, K & Papadopoulos, T. 2022. A planetary boundaries perspective on the sustainability: resilience relationship in the Kenyan tea supply chain. *Annals of Operations Research*. 319(1). doi.org/10.1007/s10479-021-04096-y.

Natow, RS. 2020. The use of triangulation in qualitative studies employing elite interviews. *Qualitative Research*. 20(2):160–173. doi.org/10.1177/1468794119830077.

Ncube, BM, Dube, A & Ward, K. 2021. Establishment of the African Medicines Agency: progress, challenges and regulatory readiness. *Journal of Pharmaceutical Policy and Practice*. 14(1). doi.org/10.1186/s40545-020-00281-9.

Ndomondo-Sigonda, M, Miot, J, Naidoo, S, Ambali, A, Dodoo, A & Mkandawire, H. 2018. The African Medicines Regulatory Harmonization Initiative: Progress to Date. *Medical Research Archives*. 6(2). doi.org/10.18103/mra.v6i2.1668.

Neri, S, Pinnington, AH, Lahrech, A & Al-Malkawi, HAN. 2019. Top executives' perceptions of the inclusion of corporate social responsibility in quality management. *Business Ethics*. 28(4). doi.org/10.1111/beer.12235.

Ngulube, P. 2021. Using Simple and Complex Mixed Methods Research Designs to Understand Research in Information Science. doi.org/10.4018/978-1-7998-8844-4.ch002.

Nieuwenhuis, P, Touboulic, A & Matthews, L. 2019. Is Sustainable Supply Chain Management Sustainable? Scalability of food sustainability View project How environmentally sustainable are Sustainable Supply Chain Management strategies? A critical evaluation of the theory and practice of Sustainable Supply Chain Management View project. *Springer*. 7:13–30. doi.org/10.1007/978-3-030-15066-2\_2.

Nowell, LS, Norris, JM, White, DE & Moules, NJ. 2017. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*. 16(1). doi.org/10.1177/1609406917733847.

Nsowah, J & Phiri, MA. 2023. Sustainable Supply Chain Management Practices in Ghana. *International Journal of Environmental, Sustainability, and Social Science*. 4(1):256–267. Available from: <https://journalkeberlanjutan.keberlanjutanstrategis.com/index.php/ijesss/article/view/393> [Accessed 11 July 2023].

Ogah, M & Asiegbu, G. 2022. Sustainable Supply Chain Management in Sub-Saharan Africa. 87–113. doi.org/10.1007/978-3-031-04923-1\_6.

Olmos-Vega, FM, Stalmeijer, RE, Varpio, L & Kahlke, R. 2023. A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Medical Teacher*. 45(3). doi.org/10.1080/0142159X.2022.2057287.

- Omoush, MM, Mohammad, M & Faculty, O. 2020. Investigation the Relationship Between Supply Chain Management Activities and Operational Performance: Testing the Mediating Role of Strategic Agility A Practical Study on the Pharmaceutical Companies. *International Business Research*. 13(2). doi.org/10.5539/ibr.v13n2p74.
- O’Neil, J. 2018. ‘People, Planet, Profits’ and Perception Politics: A Necessary Fourth (and Fifth) Bottom Line? Critiquing the Current Triple Bottom Line in the Australian Context. doi.org/10.1007/978-981-10-5047-3\_2.
- Ouf, S. 2021. A Proposed Architecture for Pharmaceutical Supply Chain Based Semantic Blockchain. *International Journal of Intelligent Engineering and Systems*. 14(3). doi.org/10.22266/ijies2021.0630.04.
- Owusu-Asante, M, Darko, DM, Asamoah-Okyere, KD, Asante-Boateng, S, Kermad, A, Walker, S & Salek, S. 2023. Evaluation of the Food and Drugs Authority, Ghana Regulatory Review Process: Challenges and Opportunities. *Therapeutic Innovation and Regulatory Science*. 57(2). doi.org/10.1007/s43441-022-00478-x.
- Pagell, M & Wu, Z. 2009. Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. *Journal of Supply Chain Management*. 45(2). doi.org/10.1111/j.1745-493X.2009.03162.x.
- Papalexii, M, Bamford, D & Breen, L. 2020. Key sources of operational inefficiency in the pharmaceutical supply chain. *Supply Chain Management*. 25(6). doi.org/10.1108/SCM-02-2019-0076.
- Patrucco, AS, Luzzini, D & Ronchi, S. 2017. Achieving innovation through supplier collaboration: the role of the purchasing interface. *Business Process Management Journal*. 23(6):1270–1289. doi.org/10.1108/BPMJ-10-2016-0202.
- Pereira, THM & Martins, HC. 2021. People, Planet, and Profit: A Bibliometric Analysis of Triple Bottom Line Theory. *Journal of Management and Sustainability*. 11(1). doi.org/10.5539/jms.v11n1p64.
- Pereseina, V, Jensen, LM, Hertz, S & Cui, L. 2014. Challenges and conflicts in sustainable supply chain management: Evidence from the heavy vehicle industry. *Supply Chain Forum*. 15(1):22–32. doi.org/10.1080/16258312.2014.11517331.

- Pettersson, AI & Segerstedt, A. 2013. Measuring supply chain cost. In: *International Journal of Production Economics*. V. 143. 357–363. doi.org/10.1016/j.ijpe.2012.03.012.
- Phillips, R, Schrempf-Stirling, J & Stutz, C. 2020. The Past, History, and Corporate Social Responsibility. *Journal of Business Ethics*. 166(2). doi.org/10.1007/s10551-019-04319-0.
- PhRMA. 2020. *Building a Better Health Care System | Pharmaceutical Research and Manufacturers of America*. Available from: <https://phrma.org/en> [Accessed 7 September 2023].
- Plöckinger, M, Aschauer, E, Hiebl, MRW & Rohatschek, R. 2016a. The influence of individual executives on corporate financial reporting: A review and outlook from the perspective of upper echelons theory. *Journal of Accounting Literature*. 37:55–75. doi.org/10.1016/j.acclit.2016.09.002.
- Plöckinger, M, Aschauer, E, Hiebl, MRW & Rohatschek, R. 2016b. The influence of individual executives on corporate financial reporting: A review and outlook from the perspective of upper echelons theory. *Journal of Accounting Literature*. 37. doi.org/10.1016/j.acclit.2016.09.002.
- Poslajko, K. 2020. Can Deflationism Save Interpretivism? *Philosophia (United States)*. 48(2):709–725. doi.org/10.1007/s11406-019-00155-8.
- Powrie-Smith, A. 2017. European Federation of Pharmaceutical Industries and Associations. *Impact*. 2017(2). doi.org/10.21820/23987073.2017.2.38.
- Prajogo, D, Mena, C & Chowdhury, M. 2021. The role of strategic collaborations and relational capital in enhancing product performance – a moderated-mediated model. *International Journal of Operations and Production Management*. 41(3). doi.org/10.1108/IJOPM-05-2020-0256.
- Prasad, M. 2021. Pragmatism as Problem Solving. *Socius*. 7. doi.org/10.1177/2378023121993991.
- Punch, KF. 2005. *Introduction to Social Research: Quantitative and Qualitative Approaches*. Sage.
- Puspita, LE, Christiananta, B & Ellitan, L. 2020. The effect of strategic orientation, supply chain capability, innovation capability on competitive advantage and performance of furniture retails. *International Journal of Scientific and Technology Research*. 9(3).

- Rachmat Hidayat, RD, Azis, Y, Yunizar, Y & Amzal, C. 2020. The effect of auditor commitment on supply chain performance: Moderating role of supply chain top management support. *International Journal of Supply Chain Management*. 9(4).
- Raja, GB. 2021. Impact of Internet of Things, Artificial Intelligence, and Blockchain Technology in Industry 4.0. In: *Internet of Things, Artificial Intelligence and Blockchain Technology*. doi.org/10.1007/978-3-030-74150-1\_8.
- Raju, G, Sarkar, P, Singla, E, Singh, H & Sharma, RK. 2016. Comparison of environmental sustainability of pharmaceutical packaging. *Perspectives in Science*. 8. doi.org/10.1016/j.pisc.2016.06.058.
- Raka, C & Liangrokpart, J. 2017. An Analytical Hierarchy Process (AHP) Approach to Risk Analysis: A Case Study of a New Generic Drug Development Process. *Journal of Pharmaceutical Innovation*. 12(4). doi.org/10.1007/s12247-017-9298-5.
- Rashid, Y, Rashid, A, Warraich, MA, Sameen Sabir, S & Waseem, A. 2019. Case Study Method: A Step-by-Step Guide for Business Researchers. *journals.sagepub.com*. 18. doi.org/10.1177/1609406919862424.
- Raykov, T, Gabler, S & Dimitrov, DM. 2016. Maximal Reliability and Composite Reliability: Examining Their Difference for Multicomponent Measuring Instruments Using Latent Variable Modeling. *Structural Equation Modeling*. 23(3). doi.org/10.1080/10705511.2014.966369.
- Reefke, H & Sundaram, D. 2017. Key themes and research opportunities in sustainable supply chain management – identification and evaluation. *Omega (United Kingdom)*. 66. doi.org/10.1016/j.omega.2016.02.003.
- Rejeb, A, Keogh, JG & Treiblmaier, H. 2019. Leveraging the Internet of Things and blockchain technology in Supply Chain Management. *Future Internet*. 11(7). doi.org/10.3390/fi11070161.
- Riazi, AM, Ghanbar, H & Rezvani, R. 2023. Qualitative Data Coding and Analysis: A Systematic Review of the Papers Published in the “Journal of Second Language Writing”. *Iranian Journal of Language Teaching Research*. 11(1):25–47. doi.org/10.30466/ijltr.2023.121271.

- Ricardianto, P, Barata, FA, Mardiyani, S, Setiawan, EB, Subagyo, H, Saribanon, E & Endri, E. 2022. Supply chain management evaluation in the oil and industry natural gas using SCOR model. *Uncertain Supply Chain Management*. 10(3). doi.org/10.5267/j.uscm.2022.4.001.
- Ridder, HG. 2017. The theory contribution of case study research designs. *Business Research*. 10(2). doi.org/10.1007/s40685-017-0045-z.
- Ríos, JR, Duque, DFM & Gómez, JCO. 2019. Operational supply chain risk identification and prioritization using the SCOR model. *Ingenieria y Universidad*. 23(1). doi.org/10.11144/Javeriana.iyu23-1.oscr.
- Roberts, JM. 2014. Critical Realism, Dialectics, and Qualitative Research Methods. *Journal for the Theory of Social Behaviour*. 44(1). doi.org/10.1111/jtsb.12056.
- Roemer, E, Schuberth, F & Henseler, J. 2021. HTMT2—an improved criterion for assessing discriminant validity in structural equation modeling. *Industrial Management and Data Systems*. 121(12). doi.org/10.1108/IMDS-02-2021-0082.
- Ruggiano, N & Perry, TE. 2019. Conducting secondary analysis of qualitative data: Should we, can we, and how? *Qualitative Social Work*. 18(1):81–97. doi.org/10.1177/1473325017700701.
- Rule, P & John, VM. 2015. A Necessary Dialogue: Theory in Case Study Research. *International Journal of Qualitative Methods*. 14(4). doi.org/10.1177/1609406915611575.
- Ruppel, OC. 2022. Chapter 28: Trade, Environment and Sustainable Development. In: *Environmental Law and Policy in Namibia*. Nomos Verlagsgesellschaft mbH & Co. KG. 709–766. doi.org/10.5771/9783748933564-709.
- Rydenfelt, H. 2021. Realism without representationalism. *Synthese*. 198(4). doi.org/10.1007/s11229-019-02251-4.
- Saen, RF & Izadikhah, M. 2022. A novel SCOR approach to assess the sustainability of supply chains. *Operations Management Research*. doi.org/10.1007/s12063-022-00331-2.
- Sajjad, A, Eweje, G & Tappin, D. 2020. Managerial perspectives on drivers for and barriers to sustainable supply chain management implementation: Evidence from New Zealand. *Business Strategy and the Environment*. 29(2). doi.org/10.1002/bse.2389.

- Sánchez-Flores, RB, Cruz-Sotelo, SE, Ojeda-Benitez, S & Ramírez-Barreto, ME. 2020. Sustainable supply chain management-A literature review on emerging economies. *Sustainability (Switzerland)*. 12(17):6972. doi.org/10.3390/SU12176972.
- Sandberg, E & Abrahamsson, M. 2010. The role of top management in supply chain management practices. *International Journal of Retail and Distribution Management*. 38(1). doi.org/10.1108/09590551011016331.
- Saragih, J, Tarigan, A, Silalahi, EF, Wardati, J & Pratama, I. 2020. Supply chain operational capability and supply chain operational performance: Does the supply chain management and supply chain integration matters? *International Journal of Supply Chain Management*. 9(4).
- Sarkar, B, Omair, M & Kim, N. 2020. A cooperative advertising collaboration policy in supply chain management under uncertain conditions. *Applied Soft Computing Journal*. 88. doi.org/10.1016/j.asoc.2019.105948.
- Sarkis, J. 2021. Supply chain sustainability: learning from the COVID-19 pandemic. *International Journal of Operations and Production Management*. 41(1). doi.org/10.1108/IJOPM-08-2020-0568.
- Sarwar, B. 2020. *Supply Chain Management in Pharmaceutical Industry - Enhelion Blogs*. Available from: <https://enhelion.com/blogs/2020/12/30/supply-chain-management-in-pharmaceutical-industry/> [Accessed 27 October 2022].
- Sass, DA. 2010. Factor loading estimation error and stability using exploratory factor analysis. *Educational and Psychological Measurement*. 70(4). doi.org/10.1177/0013164409355695.
- Sasu, S, Kümmerer, K & Kranert, M. 2011. Assessment of pharmaceutical waste management at selected hospitals and homes in Ghana. <https://doi.org/10.1177/0734242X11423286>. 30(6):625–630. doi.org/10.1177/0734242X11423286.
- Saunders, MNK, Lewis, P & Thornhill, A. 2019. *Research Methods for Business Students (Eight Edition)*.
- Saunders, MNPL and AT. 2019. *Research methods for business students / Mark Saunders, Philip Lewis, Adrian Thornhill*.
- Saunders, M, Thornhill, A, & Lewis, P. 2007. *Research Methods for Business Students (4th ed.)*. Harlow: Prentice Hall. 10(4).

- Saunders, M, Lewis, P & Thornhill, A. 2015. *Research Methods for Business Students 7th Edition 2015* (Mark N. K. Saunders , Philip Lewis , Adrian Thornhill). V. 66.
- Saunders, MNK, Lewis, P & Thornhill, A. 2019. Chapter 4: Understanding research philosophy and approaches to theory development. In: *Research Methods for Business Studies*.
- Saunders et al. 2016. *Research Methods for Business Students - Mark Saunders, Philip Lewis, Adrian Thornhill - Google Books*.
- Scavarda, A, Daú, GL, Scavarda, LF & Korzenowski, AL. 2019. A proposed healthcare supply chain management framework in the emerging economies with the sustainable lenses: The theory, the practice, and the policy. *Resources, Conservation and Recycling*. 141. doi.org/10.1016/j.resconrec.2018.10.027.
- Schmaus, W. 2020. From positivism to conventionalism: Comte, Renouvier, and Poincaré. *Studies in History and Philosophy of Science Part A*. 80:102–109. doi.org/10.1016/j.shpsa.2019.06.003.
- Scholten, K & Fynes, B. 2017a. Risk and Uncertainty Management for Sustainable Supply Chains. 413–436. doi.org/10.1007/978-3-319-29791-0\_19.
- Scholten, K & Fynes, B. 2017b. Risk and Uncertainty Management for Sustainable Supply Chains. Springer, Cham. 413–436. doi.org/10.1007/978-3-319-29791-0\_19.
- Scholten, K & Fynes, B. 2017c. Risk and Uncertainty Management for Sustainable Supply Chains. In: *Springer Series in Supply Chain Management*. V. 4. doi.org/10.1007/978-3-319-29791-0\_19.
- Schoonenboom, J & Johnson, RB. 2017. How to Construct a Mixed Methods Research Design. *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie*. 69(S2). doi.org/10.1007/s11577-017-0454-1.
- Schulte, M & Paris, CM. 2022. Supply chain transparency, ethical sourcing, and synthetic diamond alternatives: exploring the perspectives of diamond retailers. *International Journal of Intelligent Enterprise*. 9(4). doi.org/10.1504/ijie.2022.126399.
- Seiter, A. 2010. *A Practical Approach to Pharmaceutical Policy*. doi.org/10.1596/978-0-8213-8386-5.

- Sekaran, U & Bougie, R. 2016. Research methods: A skill building approach. John Wiley & Sons. *Leadership & Organization Development Journal*.
- Selvi, AF. 2019. Qualitative content analysis. In: *The Routledge Handbook of Research Methods in Applied Linguistics*. Taylor and Francis. 440–452. doi.org/10.4324/9780367824471-37.
- Shani, AB & Coghlan, D. 2021. Action research in business and management: A reflective review. *Action Research*. 19(3). doi.org/10.1177/1476750319852147.
- Shannon-Baker, P. 2016. Making paradigms meaningful in mixed methods research. *Journal of mixed methods research*. 10(4):1–16. doi.org/10.1177/1558689815575861.
- Sharma, G. 2017. Pros and cons of different sampling techniques. *International Journal of Applied Research*. 3(7).
- Sharma, S & Modgil, S. 2020. TQM, SCM and operational performance: an empirical study of Indian pharmaceutical industry. *Business Process Management Journal*. 26(1). doi.org/10.1108/BPMJ-01-2018-0005.
- Sharma, A, Gupta, P & Jha, R. 2020. COVID-19: Impact on Health Supply Chain and Lessons to Be Learnt. *Journal of Health Management*. 22(2). doi.org/10.1177/0972063420935653.
- Sharma, S, Das, J, Braje, WM, Dash, AK & Handa, S. 2020. A Glimpse into Green Chemistry Practices in the Pharmaceutical Industry. *ChemSusChem*. 13(11). doi.org/10.1002/cssc.202000317.
- Shree Bhagwati. 2016. *Overview of Ghana Pharmaceutical Industry*. Available from: <https://www.bhagwatipharma.com/ghana-pharmaceutical-industry-overview/> [Accessed 18 June 2022].
- Siagian, H, Jiwa, Z & Tarigan, H. 2021. The Impact of Top Management Commitment, Green Purchasing, and Supply Chain Management Practices on Operational Performance. *International Journal of Innovation, Creativity and Change*. www.ijicc.net. 15(4).
- Siegel, DS & Vitaliano, DF. 2007. An empirical analysis of the strategic use of corporate social responsibility. *Journal of Economics and Management Strategy*. 16(3). doi.org/10.1111/j.1530-9134.2007.00157.x.

Siems, E, Seuring, S & Schilling, L. 2023. Stakeholder roles in sustainable supply chain management: a literature review. *Journal of Business Economics*. 93(4):747–775. doi.org/10.1007/s11573-022-01117-5.

Simon, A & Kotei, JA. 2014. Supply Chain Management of the Pharmaceutical Industry for Quality Health Care Delivery : Consumer Perception of Ernest Chemists Limited as a Pharmaceutical Service Provider in Ghana. *Journal of Information Engineering and Applications*. 4(8):15–40.

Singh, RK, Kumar, R & Kumar, P. 2016. Strategic issues in pharmaceutical supply chains: a review. *International Journal of Pharmaceutical and Healthcare Marketing*. 10(3). doi.org/10.1108/IJPHM-10-2015-0050.

Singleton, JrR & Straits, BC. 2012. U ntil recently, surveys were carried out via telephone or facetoface. *The SAGE Handbook of Interview Research: The Complexity of the Craft*. Available from:

<https://books.google.com/books?hl=en&lr=&id=IZYgAQAQBAJ&oi=fnd&pg=PT149&dq=U+ntil+recently,+surveys+were+carried+out+via+telephone+or+facetoface+RA+Singleton+Jr,+BC+Straits&ots=fg3BN3cTji&sig=ZPTjlXCrl50bLvt1L5bPiqVNMww> [Accessed 18 October 2023].

Slaper, TF. 2011. The Triple Bottom Line: What Is It and How Does It Work? The Triple Bottom Line Defined. *Indiana Business Review*. 86(1).

Sood, N, Mulligan, K & Zhong, K. 2021. Do companies in the pharmaceutical supply chain earn excess returns? *International Journal of Health Economics and Management*. 21(1). doi.org/10.1007/s10754-020-09291-1.

Sparks, CS & Joyner, K. 2019. Population Research Briefs in Population Research and Policy Review. *Population Research and Policy Review*. 38(2). doi.org/10.1007/s11113-019-09522-5.

Srinivasan, R & Lohith, CP. 2017. Pilot Study—Assessment of Validity and Reliability. doi.org/10.1007/978-981-10-3590-6\_6.

Streefkerk, R. 2019. *Inductive vs. Deductive Research Approach*. Available from: <https://www.scribbr.com/methodology/inductive-deductive-reasoning/> [Accessed 25 October 2023].

- Suárez-Eiroa, B, Fernández, E, Méndez-Martínez, G & Soto-Oñate, D. 2019. Operational principles of circular economy for sustainable development: Linking theory and practice. *Journal of Cleaner Production*. 214. doi.org/10.1016/j.jclepro.2018.12.271.
- Surbhi. 2016. Difference Between Primary and Secondary Data. *Key Differences*.
- Taherdoost, H. 2016. Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *International Journal of Academic Research in Management (IJARM)*, Helvetic Editions, 2016, 5. fhal-02546796. *International Journal of Academic Research in Management (IJARM)*. 5(2).
- Taherdoost, H. 2018a. Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *SSRN Electronic Journal*. doi.org/10.2139/ssrn.3205035.
- Taherdoost, H. 2018b. Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. *SSRN Electronic Journal*. doi.org/10.2139/ssrn.3205040.
- Taherdoost, H & Brard, A. 2019. Analyzing the Process of Supplier Selection Criteria and Methods. In: *Procedia Manufacturing*. V. 32. Elsevier B.V. 1024–1034. doi.org/10.1016/j.promfg.2019.02.317.
- Tajri, H & Chafi, A. 2019. Digital transformation in supply chain: Supply chain urbanization model applied to “order to cash” cycle. *International Journal of Engineering Research in Africa*. 45. doi.org/10.4028/www.scientific.net/JERA.45.171.
- Tarigan, ZJH, Siagian, H & Jie, F. 2021. Impact of internal integration, supply chain partnership, supply chain agility, and supply chain resilience on sustainable advantage. *Sustainability (Switzerland)*. 13(10). doi.org/10.3390/su13105460.
- Teodor, C, Trică, CL, Ignat, R & Drăcea, RM. 2020. Good practices of efficient packaging waste management. *Amfiteatru Economic*. 22(55). doi.org/10.24818/EA/2020/55/937.
- Tessier, Y, Achanzar, W, Mihalcik, L, Amuzie, C, Andersson, P, Parry, JD, Moggs, J & Whiteley, LO. 2021. Outcomes of the European Federation of Pharmaceutical Industries and Associations Oligonucleotide Working Group Survey on Nonclinical Practices and Regulatory Expectations for Therapeutic Oligonucleotide Safety Assessment. *Nucleic Acid Therapeutics*. 31(1). doi.org/10.1089/nat.2020.0892.

- Theophilus Ampah, I & Sidi Ali, R. 2019. The Role of Service Quality in Patients (Customer) Satisfaction in Public Healthcare Institutions in Ghana. *INTERNATIONAL JOURNAL OF INNOVATION AND ECONOMIC DEVELOPMENT*. 5(2). doi.org/10.18775/ijied.1849-7551-7020.2015.52.2005.
- Thorlakson, T, De Zegher, JF & Lambin, EF. 2018. Companies' contribution to sustainability through global supply chains. *Proceedings of the National Academy of Sciences of the United States of America*. 115(9):2072–2077. doi.org/10.1073/pnas.1716695115.
- Ting, IWK, Azizan, NAB & Kweh, QL. 2015a. Upper Echelon Theory Revisited: The Relationship between CEO Personal Characteristics and Financial Leverage Decision. *Procedia - Social and Behavioral Sciences*. 195:686–694. doi.org/10.1016/j.sbspro.2015.06.276.
- Ting, IWK, Azizan, NAB & Kweh, QL. 2015b. Upper Echelon Theory Revisited: The Relationship between CEO Personal Characteristics and Financial Leverage Decision. *Procedia - Social and Behavioral Sciences*. 195. doi.org/10.1016/j.sbspro.2015.06.276.
- Tobi, H & Kampen, JK. 2018. Research design: the methodology for interdisciplinary research framework. *Quality and Quantity*. 52(3). doi.org/10.1007/s11135-017-0513-8.
- Torrance, H. 2012. Triangulation, Respondent Validation, and Democratic Participation in Mixed Methods Research. *Journal of Mixed Methods Research*. 6(2). doi.org/10.1177/1558689812437185.
- Tran, NM & Pham, BNT. 2020. The influence of CEO characteristics on corporate environmental performance of SMEs: Evidence from Vietnamese SMEs. *Management Science Letters*. 10(8). doi.org/10.5267/j.msl.2020.1.013.
- Trautmann, L, Hübner, T & Lasch, R. 2022. Blockchain concept to combat drug counterfeiting by increasing supply chain visibility. *International Journal of Logistics Research and Applications*. doi.org/10.1080/13675567.2022.2141214.
- Treves, L. 2015. *The Way to Effective and Sustainable Supply Chain Management in the Pharmaceutical Industry*. Available from: <https://www.theseus.fi/handle/10024/92707> [Accessed 20 April 2022].

- Truong, HQ, Sameiro, M, Fernandes, AC, Sampaio, P, Duong, BAT, Duong, HH & Vilhenac, E. 2017. Supply chain management practices and firms' operational performance. *International Journal of Quality and Reliability Management*. 34(2):176–193. doi.org/10.1108/IJQRM-05-2015-0072.
- Turkulainen, V, Roh, J, Whipple, JM & Swink, M. 2017. Managing Internal Supply Chain Integration: Integration Mechanisms and Requirements. *Journal of Business Logistics*. 38(4). doi.org/10.1111/jbl.12165.
- Tyan, J, Moheno, J, Carolina Pérez Hernández, C, Zimon, D & Sroufe, R. 2020. Drivers of Sustainable Supply Chain Management: Practices to Alignment with Un Sustainable Development Goals. *International Journal for Quality Research*. 14(1):219–236. Available from: <https://www.academia.edu/download/68128472/ijqr14.pdf> [Accessed 11 March 2022].
- Tzempelikos, N. 2015. Top management commitment and involvement and their link to key account management effectiveness. *Journal of Business and Industrial Marketing*. 30(1). doi.org/10.1108/JBIM-12-2012-0238.
- UNDP. 2023. *Medicines and medical products procured by UNDP | United Nations Development Programme*. Available from: <https://www.undp.org/ukraine/medicines-and-medical-products-procured-undp> [Accessed 7 September 2023].
- United Nations. 2015. *UN Global Compact and PRME Announce Student Engagement Platform to Support the SDGs*. Available from: <https://www.un.org/youthenvoy/2016/09/un-global-compact-prme-announce-student-engagement-platform-support-sdgs/> [Accessed 7 August 2023].
- United Nations. 2016. *About the Sustainable Development Goals - United Nations Sustainable Development*.
- Varsei, M, Soosay, C, Fahimnia, B & Sarkis, J. 2014. Framing sustainability performance of supply chains with multidimensional indicators. *Supply Chain Management*. 19(3). doi.org/10.1108/SCM-12-2013-0436.
- Velenturf, APM & Purnell, P. 2021. Principles for a sustainable circular economy. *Sustainable Production and Consumption*. 27. doi.org/10.1016/j.spc.2021.02.018.

- Veleva, VR, Cue, BW, Todorova, S, Thakor, H, Mehta, NH & Padia, KB. 2018. Benchmarking green chemistry adoption by the Indian pharmaceutical supply chain. *Green Chemistry Letters and Reviews*. 11(4):439–456. doi.org/10.1080/17518253.2018.1530802.
- Veleva, VR, Cue, BW & Todorova, S. 2018. Benchmarking Green Chemistry Adoption by the Global Pharmaceutical Supply Chain. *ACS Sustainable Chemistry and Engineering*. 6(1):2–14. doi.org/10.1021/acssuschemeng.7b02277.
- Vicente, JR, Rafiei Miandashti, A, Sy Piecco, KWE, Pyle, JR, Kordesch, ME, Chen, J & Basis, L. 2019. SUPPLY CHAIN MANAGEMENT POLICY. *ACS Applied Materials & Interfaces*. 11(19).
- Vogel, C, Koutsombogera, M & Costello, R. 2020. Analyzing Likert Scale Inter-annotator Disagreement. In: *Smart Innovation, Systems and Technologies*. V. 151. Springer Science and Business Media Deutschland GmbH. 383–393. doi.org/10.1007/978-981-13-8950-4\_34.
- Waddock, S & Bodwell, C. 2004. Managing responsibility: What can be learned from the quality movement? In: *California Management Review*. V. 47. doi.org/10.2307/41166285.
- Wang, J & Dai, J. 2018. Sustainable supply chain management practices and performance. *Industrial Management and Data Systems*. 118(1):2–21. doi.org/10.1108/IMDS-12-2016-0540.
- Wang, X & Cheng, Z. 2020. Cross-Sectional Studies: Strengths, Weaknesses, and Recommendations. *Chest*. 158(1). doi.org/10.1016/j.chest.2020.03.012.
- Wang, K, Xu, Y, Wang, C, Tan, M & Chen, P. 2020. A Corrected Goodness-of-Fit Index (CGFI) for Model Evaluation in Structural Equation Modeling. *Structural Equation Modeling*. 27(5). doi.org/10.1080/10705511.2019.1695213.
- Wang, S, Li, J & Zhao, D. 2018. Institutional Pressures and Environmental Management Practices: The Moderating Effects of Environmental Commitment and Resource Availability. *Business Strategy and the Environment*. 27(1):52–69. doi.org/10.1002/bse.1983.
- van Weele, A & van Tubergen, K. 2017. Responsible Purchasing: Moving from Compliance to Value Creation in Supplier Relationships. In: *Springer Series in Supply Chain Management*. V. 4. doi.org/10.1007/978-3-319-29791-0\_11.

- Wiles, R, Crow, G & Pain, H. 2011. Innovation in qualitative research methods: A narrative review. *Qualitative Research*. 11(5):587–604. doi.org/10.1177/1468794111413227.
- Wilkinson, JL, Boxall, ABA, Kolpin, DW, Leung, KMY, Lai, RWS, Galban-Malag, C, Adell, AD, Mondon, J, et al. 2022. Pharmaceutical pollution of the world's rivers. *Proceedings of the National Academy of Sciences of the United States of America*. 119(8). doi.org/10.1073/pnas.2113947119.
- Wiśniowski, A, Sakshaug, JW, Perez Ruiz, DA, & Blom, AG. 2020. Integrating probability and nonprobability samples for survey inference. *Journal of Survey Statistics and Methodology*. 8(1):120–147. doi.org/10.1093/jssam/smz051.
- World Economic Forum. 2022. *Supply Chain Sustainability Policies: State of Play | World Economic Forum*. Available from: <https://www.weforum.org/whitepapers/supply-chain-sustainability-policies-state-of-play/> [Accessed 19 July 2022].
- Xie, Y & Breen, L. 2012. Greening community pharmaceutical supply chain in UK: A cross boundary approach. *Supply Chain Management*. 17(1). doi.org/10.1108/13598541211212195.
- Xu, H & Zhao, C. 2022a. Supply Chain Management Practices Influence Supply Chain Performance With Mediation Role of Innovation and Moderation Role of Top Management Support. *Frontiers in Public Health*. 10. doi.org/10.3389/fpubh.2022.813828.
- Xu, H & Zhao, C. 2022b. Supply Chain Management Practices Influence Supply Chain Performance With Mediation Role of Innovation and Moderation Role of Top Management. *ncbi.nlm.nih.gov*. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9198219/> [Accessed 24 October 2022].
- Yamane, T. 1967. *Statistics: An introductory analysis*. Available from: <http://www.sidalc.net/cgi-bin/wxis.exe/?IsisScript=bac.xis&method=post&formato=2&cantidad=1&expresion=mfn=033304> [Accessed 23 November 2021].
- Yang, J, Han, Q, Zhou, J & Yuan, C. 2015. The influence of environmental management practices and supply chain integration on technological innovation performance-Evidence from China's manufacturing industry. *Sustainability (Switzerland)*. 7(11). doi.org/10.3390/su71115342.

- Yang, MG, Hong, P & Modi, SB. 2011. Impact of lean manufacturing and environmental management on business performance: An empirical study of manufacturing firms. *International Journal of Production Economics*. 129(2). doi.org/10.1016/j.ijpe.2010.10.017.
- Yang, Y, Chen, J, Lee, PKC & Cheng, TCE. 2023. How to enhance the effects of the green supply chain management strategy in the organization: A diffusion process perspective. *Transportation Research Part E: Logistics and Transportation Review*. 175. doi.org/10.1016/j.tre.2023.103148.
- Young, M, Varpio, L, Uijtdehaage, S & Paradis, E. 2020. The Spectrum of Inductive and Deductive Research Approaches Using Quantitative and Qualitative Data. *Academic Medicine*. 95(7). doi.org/10.1097/ACM.00000000000003101.
- Yu, DEC, Razon, LF & Tan, RR. 2020. Can global pharmaceutical supply chains scale up sustainably for the COVID-19 crisis? *Resources, Conservation and Recycling*. 159. doi.org/10.1016/j.resconrec.2020.104868.
- Yulianto, H. 2021. Philosophy of Management Science: Ontology, Epistemology, and Axiology Perspectives. *Cross-Border Journal of Business Management*. 1(1).
- Yusliza, MY, Norazmi, NA, Jabbour, CJC, Fernando, Y, Fawehinmi, O & Seles, BMRP. 2019. Top management commitment, corporate social responsibility and green human resource management: A Malaysian study. *Benchmarking*. 26(6). doi.org/10.1108/BIJ-09-2018-0283.
- Yusoff, YBM, Ashari, H Bin & Salleh, MN Bin. 2016. The impact of supply chain management as mediator between strategic orientations and supply chain performance. *International Journal of Supply Chain Management*. 5(2).
- Zahiri, B, Zhuang, J & Mohammadi, M. 2017a. Toward an integrated sustainable-resilient supply chain: A pharmaceutical case study. *Transportation Research Part E: Logistics and Transportation Review*. 103:109–142. doi.org/10.1016/j.tre.2017.04.009.
- Zahiri, B, Zhuang, J & Mohammadi, M. 2017b. Toward an integrated sustainable-resilient supply chain: A pharmaceutical case study. *Transportation Research Part E: Logistics and Transportation Review*. 103. doi.org/10.1016/j.tre.2017.04.009.

- Zaid, AA, Jaaron, AAM & Talib Bon, A. 2018. The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study. *Journal of Cleaner Production*. 204. doi.org/10.1016/j.jclepro.2018.09.062.
- Zailani, S, Jeyaraman, K, Vengadasan, G & Premkumar, R. 2012. Sustainable supply chain management (SSCM) in Malaysia: A survey. *International Journal of Production Economics*. 140(1):330–340. doi.org/10.1016/j.ijpe.2012.02.008.
- van Zanten, JA & van Tulder, R. 2018. Multinational enterprises and the Sustainable Development Goals: An institutional approach to corporate engagement. *Journal of International Business Policy*. 1(3–4). doi.org/10.1057/s42214-018-0008-x.
- Zhang, LC. 2019. On valid descriptive inference from non-probability sample. *Statistical Theory and Related Fields*. 3(2):103–113. doi.org/10.1080/24754269.2019.1666241.
- Zhou, H, Benton, WC, Schilling, DA & Milligan, GW. 2011. Supply chain integration and the SCOR model. *Journal of Business Logistics*. 32(4). doi.org/10.1111/j.0000-0000.2011.01029.x.
- Zhou, M, Govindan, K & Xie, X. 2020. How fairness perceptions, embeddedness, and knowledge sharing drive green innovation in sustainable supply chains: An equity theory and network perspective to achieve sustainable development goals. *Journal of Cleaner Production*. 260. doi.org/10.1016/j.jclepro.2020.120950.
- Zhu, Q & Sarkis, J. 2004. Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operations Management*. 22(3):265–289. doi.org/10.1016/J.JOM.2004.01.005.
- Zhu, Q & Sarkis, J. 2007. The moderating effects of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research*. 45(18–19). doi.org/10.1080/00207540701440345.

## APPENDIXES

### Appendix A: Letter of information (Top Management)

#### THE LETTER OF INFORMATION FOR THOSE PARTICIPATING IN QUESTIONNAIRE

Title of the Research Study: Sustainable Supply Chain Management Practices in the Pharmaceutical Industry of Ghana.

Principal Investigator/s/researcher: (MS. Gifty Kumadey)

Co-Investigator/s/supervisor/s: (Prof. Albert Tchev Agbenyegah)

#### Brief Introduction and Purpose of the Study:

Good morning and trust you are doing well. My name is Gifty Kumadey, a lecturer at Takoradi Technical University and a student at the Durban University of Technology conducting research for Doctor of Philosophy in Management Science, at the Department of Public Management\ Public Administration in South Africa. I am currently researching on the topic **Sustainable Supply Chain Practices in the Pharmaceutical Industry in Ghana** and kindly invite you to voluntarily partake in this research. The study seeks to elicit your opinion about sustainable supply chain practices in the upstream of the pharmaceutical companies in Ghana. Please, be informed that the questionnaire precludes any item that will reveal your identity and that of your company. It will take about 10 minutes to complete this questionnaire. Kindly note that there are no rights or wrong answers. I am only interested in your opinion.

#### Brief Introduction and Purpose of the Study:

The aim of this study is to examine the extent to which sustainability and supply chain management practices and strategies support and promote effectiveness and efficiency within the pharmaceutical industry of Ghana. Specifically, this research seeks to assess the state of the upstream pharmaceutical sustainable supply chain management practices in Ghana. Examine how upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana. To examine the role of top- management in ensuring pharmaceutical sustainable supply chain management practices in Ghana. To assess the role of the pharmaceutical policy framework of Ghana on the supply chain sustainability.

#### Outline of the Procedures:

The questionnaire is an online structured questionnaire. When you receive the link, please click on it to access the title page of the questionnaire. After reading the information on the title, click on NEXT to access the questionnaire items ONLY if you agree to voluntarily take part in the research. After responding to the items, click on Submit at the bottom of the final section of the questionnaire. Your responses are submitted automatically.

Please, be informed that the questionnaire precludes any item that will reveal your identity and that of your company. It will take about 10 minutes to complete this questionnaire. Kindly note that there are no right or wrong answers. I am only interested in your opinion. Since, it is an online questionnaire, you can respond at any time and place you find it possible to do so.

**Risks or Discomforts to the Participant:** The participants will partake in the research through emails so no foreseeable risks or discomforts will be caused to participate. There are no potential risks or discomfort to you for taking part in this research. The questionnaire items do not contain any statement that will require you to perform any act or make statements that might create discomfort, compromise you, diminish your self-esteem or cause you to experience embarrassment or regret.

**Explain to the participant the reasons he/she may be withdraw from the Study:** This study will not in any way coax the respondents into taking part in this study. A consent form will be designed and presented to all potential respondents for their informed consent before taking part in this study. Again, respondents will be made aware that they have the option to opt out of the study when they are completing the questionnaire or taking part in the interview session if they find out that they are being coaxed or under duress to participate in this study. Please, note that partaking in this research is voluntary. For personal reasons, you may withdraw from the study at any stage if you wish to do so. There will be no adverse consequences should you elect to withdraw.

**Benefits:** It is expected that this research bring out how pharmaceutical companies in Ghana could leverage on top management commitment and the supply chain sustainable for development, the researcher will conduct workshop to discuss findings of the study with the participates and management of the studied organizations. There are no direct benefits to you for taking part in this study except that your opinion will add to existing knowledge and the

outcome of the study will be presented to the Pharmaceutical Manufacturer Association of Ghana.

**Remuneration:** Please, note that the participant will not receive any monetary or other types of remuneration or compensation. No benefits will be accrued to you for taking part in this study except that your opinion will add to existing knowledge and the outcome of the study will be presented to the Pharmaceutical Manufacturer Association of Ghana. Please, note also that you will not be remunerate for taking part in this research. This study is purely for academic purpose only and a partial requirement for the award of Ph.D. in Public Management. Hence no remuneration is allocated for partaking in the research.

**Costs of the Study:**

The respondents are not expected to cover any costs towards the study except for the use of their internet data to answer the online questionnaire.

**Confidentiality:** Confidentiality refers to a situation under which a researcher is aware of the identity of a research subject but takes action to shield that identity from being identified by others. No respondent will be required to write his or her name on any of the questionnaire. Pseudonym will be used to identify the interviewee in the study where necessary. The questionnaire precludes any item that will reveal your identity and the identity of your company. The biographical information required are sex, age group, range of length of service, and whether you are a managerial employee or not. These items generic and the outcomes cannot be attributed to any individual. You are assured of utmost anonymity and confidentiality.

**Results:** The results of this study will be disseminated in two ways. First, the researcher will conduct workshop to discuss findings with the Pharmaceutical Manufacturers Association of Ghana. Secondly, the outcome will be published in recommended journals

**Research-related Injury:** There is no expected physical, psychological, or emotional injury to you for taking part in this research. The participants will partake in the research through emails so no foreseeable risks or discomforts will be caused to participate.

**Storage of all electronic and hard copies including tape recordings:** All data to be elicited from respondents will be electronic. Consequently, the data be stored electronically in Google Form and its security and confidentiality are guaranteed. Only the researcher will have access to the data until it is eventually disposed after five years. The materials obtained will be store in the

computer for 5 years as stated in the DUT institutional requirement after that it will be deleted permanently from the system

In the event of any problem or queries, do not hesitate to contact the following;

1. The Institutional Research Ethics Administrator on 031 373 2375.
2. The Director Research and Postgraduate Support on 031 373 2577 or [researchdirector@dut.ac.za](mailto:researchdirector@dut.ac.za)

## **Appendix B: Letter of information (Employees)**

### THE LETTERS OF INFORMATION FOR THOSE PARTICIPATING IN INTERVIEW

Title of the Research Study: Sustainable Supply Chain Management Practices in the Pharmaceutical Industry of Ghana.

Principal Investigator/s/researcher: (MS. Gifty Kumadey)

Co-Investigator/s/supervisor/s: (Prof. Albert Tchev Agbenyegah)

#### Brief Introduction and Purpose of the Study:

Good morning and trust you are doing well. My name is Gifty Kumadey, a lecturer at Takoradi Technical University and a 1st year student at the Durban University of Technology doing research for my Doctor of Philosophy in Management Science, in the Department of Public Management\ Public Administration in South Africa. I am currently researching on Sustainable Supply Chain Practices in the Pharmaceutical Industry in Ghana and kindly invite you to voluntarily partake in this research. The study seeks to elicit your opinion about sustainable supply chain practices. Please, be informed that the interview guide precludes any item that will reveal your identity and that of your company. It will take about 30 minutes to complete this interview. Kindly note that there are no rights or wrong answers. I am only interested in your opinion.

#### Brief Introduction and Purpose of the Study:

The aim of this study is to examine the extent to which sustainability and supply chain management practices and strategies support and promote effectiveness and efficiency within the pharmaceutical industry of Ghana. Specifically, this research seeks to assess the state of the upstream pharmaceutical sustainable supply chain management practices in Ghana. Examine how upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana. To examine the role of top- management in ensuring pharmaceutical sustainable supply chain management practices in Ghana. To assess the role of the pharmaceutical policy framework of Ghana on the supply chain sustainability.

#### Outline of the Procedures:

The Interview guide is designed in two forms: for upstream pharmaceutical companies and for officials of public sector institution. Generally, issues covered in the guide include upstream

pharmaceutical sustainable supply chain management practices in Ghana, performance of pharmaceutical companies in Ghana, role of top executives in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana, and the role of the upstream pharmaceutical policy framework. It is anticipated that every interview session shall take 1 hour to complete. The interview shall be conducted in the premises of the various companies to be selected.

This interview guide is designed to understand the nature, scope and practices of upstream pharmaceutical sustainable supply chain management practices, and performance indicators. The interview is guided by research objectives set in this study is therefore a means of soliciting information to embark on the study.

Please provide your candid views to guide this study. Please note that your responses will be treated with utmost confidentiality, information will not be divulged to any other party and anonymity will be ensured.

After reading the information on the interview guide you can agree on the date for the in-person interview ONLY if you agree to voluntarily take part in the research.

Please, be informed that the interview precludes any item that will reveal your identity and that of your company. Kindly note that there are no right or wrong answers. I am only interested in your opinion.

Risks or Discomforts to the Participant: The participants will partake in the research through person-to-person interaction so no foreseeable risks or discomforts will be caused to participate. There are no potential risks or discomfort to you for taking part in this research. The interview guide items do not contain any statement that will require you to perform any act or make statements that might create discomfort, compromise you, diminish your self-esteem or cause you to experience embarrassment or regret.

Explain to the participant the reasons he/she may be withdraw from the Study: This study will not in any way coax the respondents into taking part in this study. A consent form will be designed and presented to all potential respondents for their informed consent before taking part in this study. Again, respondents will be made aware that they have the option to opt out of the study when they are taking part in the interview session if they find out that they are being coaxed or under duress to participate in this study. Please, note that partaking in this

research is voluntary. For personal reasons, you may withdraw from the study at any stage if you wish to do so. There will be no adverse consequences should you elect to withdraw.

**Benefits:** It is expected that this research bring out how pharmaceutical companies in Ghana could leverage on top management commitment and the supply chain sustainable for development, the researcher will conduct workshop to discuss findings of the study with the participates and management of the studied organisations. There are no direct benefits to you for taking part in this study except that your opinion will add to existing knowledge and the outcome of the study will be presented to the Pharmaceutical Manufacturer Association of Ghana.

**Remuneration:** Please, note that the participant will not receive any monetary or other types of remuneration or compensation. No benefits will be accrued to you for taking part in this study except that your opinion will add to existing knowledge and the outcome of the study will be presented to the Pharmaceutical Manufacturer Association of Ghana. Please, note also that you will not be remunerate for taking part in this research. This study is purely for academic purpose only and a partial requirement for the award of Ph.D. in Public Management. Hence no remuneration is allocated for partaking in the research.

**Costs of the Study:**

The respondents are not expected to cover any costs towards the study.

**Confidentiality:** Confidentiality refers to a situation under which a researcher is aware of the identity of a research subject but takes action to shield that identity from being identified by others. No respondent will be required to write his or her name on any of the questionnaire. Pseudonym will be used to identify the interviewee in the study where necessary. The biographical information required are sex, age group, range of length of service, and whether you are a managerial employee or not. These items generic and the outcomes cannot be attributed to any individual. You are assured of utmost anonymity and confidentiality.

**Results:** The results of this study will be disseminated in two ways. First, the researcher will conduct workshop to discuss findings with the Pharmaceutical Manufacturers Association of Ghana. Secondly, the outcome will be published in recommended journals.

**Research-related Injury:** There is no expected physical, psychological, or emotional injury to you for taking part in this research.

Storage of all electronic and hard copies including tape recordings: All data to be elicited from respondents will be electronic. Only the researcher will have access to the data until it is eventually disposed after five years. The materials obtained will be store in the computer for 5 years as stated in the DUT institutional requirement after that it will be deleted permanently from the system.

Persons to contact in the Event of Any Problems or Querie in the event of any problem or queries Do not hesitate to contact the following|

3. The Institutional Research Ethics Administrator on 031 373 2375.

The Director Research and Postgraduate Support on 031 373 2577 or  
researchdirector@dut.ac.za

Principal researcher:(MS. Gifty Kumadey) 22175046@dut4life.ac.za 00233244518432

Co-Investigator/s/supervisor/s: (Prof. Albert Tchey Agbenyegah) alberta@dut.ac.za, 033  
8458876

**Appendix C: Questionnaire (Employees)**

**Durban University of Technology Faculty of Management Sciences- Research questionnaire on SSCM**

Dear Sir/Madam,

As part of the requirements to complete a PhD programme in the discipline of Public Management \ Public administration at the Durban University of Technology, I am conducting a study on a topic: Sustainable supply chain management practices in the pharmaceutical industry of Ghana. This survey is to understand the sustainable supply chain management practices within the upstream pharmaceutical industry in Ghana.

Please provide your expert opinion on the following statements. Please note that your responses will be treated with utmost confidentiality, information will not be divulged to any other party and anonymity will be ensured.

I look forward for the speedy return of the questionnaire.

For further queries, please do not hesitate to contact any of the people: The researcher on +223244518432 or [22175046@dut4life.ac.za](mailto:22175046@dut4life.ac.za), [gifty.kumadey@ttu.edu.gh](mailto:gifty.kumadey@ttu.edu.gh); The supervisor; [AlbertA@dut.ac.za](mailto:AlbertA@dut.ac.za); Institutional Research and Ethics Administrator: 0313732375 or Acting Director, Research and Post-graduate support: [@dut.ac.za](mailto:@dut.ac.za).

Thank you

**SECTION A: Demographic Information**

1. Gender  
I. Male [ ]  
II. Female [ ]
2. Experience in Years: .....
3. Your current Position: .....

**Section B: Sustainable Supply Chain Management Practices (SSCMP)**

To what extent do you disagree or agree with the following statements on SSCM Practices? Use the scale below: 1= “strongly disagree (SD)”, 2="Disagree (D)", 3="Neither Agree/Disagree (NAD)", 4="Agree (A)", to 5= “Strongly Agree (SA)”.

Code	Statements	SD	D	NAD	A	SA
SSCM1	We facilitate our suppliers implement TQM/Six sigma/TPM/TQC to build quality into the product					
SSCM2	We facilitate our suppliers in carrying out Value Engineering to reduce the cost of components.					
SSCM3	We follow Just-in-time/Scientific inventory control technique consistently to keep inventory under control in the production environment.					
SSCM4	We have implemented lean production and follow it consistently to minimize waste.					
SSCM5	We attempt to achieve economies of scale in inbound and or outbound transportation.					
SSCM6	We update our production plan as per the changing needs of customers and share the same with suppliers.					
SSCM7	Our organization responds to the needs of customers fairly quickly					
SSCM8	We estimate customers’ future needs based on realistic assessment.					
SSCM9	We communicate customers’ future needs to the suppliers quickly.					
SSCM10	EMSs are in place in our organization in terms of ISO 14001 certification or any comparable EMS.					

SSCM11	We provide design specification to suppliers that include environmental compliance for purchased item.					
SSCM12	Our suppliers are credited with ISO 14001 certification or any comparable EMS.					
SSCM13	We address environmental concerns of our customers in terms of eco-friendly design/distribution of products.					
SSCM14	We address environmental concerns of our customers by adopting cleaner production.					
SSCM15	We have successfully designed our products which consume reduced amount of input materials / energy.					
SSCM16	The safety measures undertaken by our organization are quite advanced and reduce the risk to accident.					
SSCM17	Our organization provides healthy and positive working environment for the employees.					
SSCM18	Use of child labour and forced labour is not allowed in our organization.					
SSCM19	The wages and perquisites given out to the employees are sufficient to meet their basic needs in our organization.					
SSCM20	Our employees are entitled to leave, provident fund, medical benefits and other facilities.					
SSCM21	We provide employment/business opportunities to the surrounding community.					
SSCM22	We provide health care facilities to the local community.					

SSCM23	We provide primary education facilities to the surrounding people.					
--------	--	--	--	--	--	--

### Section C: Sustainable Supply Chain Management (SSCMP) Performance

To what extent do you disagree or agree with the following statements on SSCM Performance? Use the scale below: 1= “strongly disagree (SD)”, 2="Disagree (D)", 3="Neither Agree/Disagree (NAD)", 4="Agree (A)", to 5= “Strongly Agree (SA)”.

Code	Statements	S D	D	NA D	A	S A
EPR1	SSCM measures have reduced the cost of effluent treatment and effluent discharge.					
EPR2	SSCM measures have reduced the discharge of toxic materials.					
EPR3	SSCM measures have reduced the frequency of environmental accident.					
OPR1	SSCM measures have led to the decrease in cost of production.					
OPR2	SSCM measures have improved the efficiency of inbound logistics.					
OPR3	SSCM measures have improved the efficiency of outbound logistics.					
CSP1	CSP1: SSCM measures have improved the opportunities of the surrounding community in respect of employment/business.					
CSP2	CSP2: SSCM measures have improved the literacy/level of education of the surrounding people.					
CSP3	CSP3: The proportion of time the surrounding people remain productive and free from ailments has increased due to health care facilities.					

### Section D: Top management Commitment

To what extent do you disagree or agree with the following statements on Top management Commitment? Use the scale below: 1= “strongly disagree (SD)”, 2="Disagree (D)", 3="Neither Agree/Disagree (NAD)", 4="Agree (A)", to 5= “Strongly Agree (SA)”.

Co	Statements	S	D	N	A	S
de		D	D	D	A	A
TM C1	Top management affirms the importance of SSCM as a major strategic orientation for the company					
TM C2	Top management sets an example to SSCM for the rest of the organization					
TM C3	Top management closely overviews all the activities concerning the management of our key accounts					
TM C4	Top management has no hesitation to spend a lot of time to contribute to the attainment of SSCM					
TM C5	Top management always stresses the importance that all units can contribute in delivering value to our key customers					
TM C6	Top management allocates the required resources (money, time, personnel) for undertaking SSCM practices					
TM C7	Top management systematically monitors the SSCM function within the company					
TM C8	Top-management actively participates in the designing SSCM functions					
TM C9	Top management compensates/rewards the actions and initiatives that lead to the development of SSCM					

**THANK YOU**

## **Appendix D: Interview Guide for Upstream Pharmaceutical Companies (Top management)**

Dear Sir/Madam,

As part of the requirements to complete a PhD programme in the discipline of Public Management \ Public administration at the Durban University of Technology, I am conducting a study on a topic: Sustainable supply chain management practices in the pharmaceutical industry of Ghana. This survey is to understand the sustainable supply chain management practices within the upstream pharmaceutical industry in Ghana.

Please provide your expert opinion on the following statements. Please note that your responses will be treated with utmost confidentiality, information will not be divulged to any other party and anonymity will be ensured.

I look forward for the speedy return of the questionnaire.

For further queries, please do not hesitate to contact any of the people: The researcher on +223244518432 or [22175046@dut4life.ac.za](mailto:22175046@dut4life.ac.za), [gifty.kumadey@ttu.edu.gh](mailto:gifty.kumadey@ttu.edu.gh); The supervisor; [AlbertA@dut.ac.za](mailto:AlbertA@dut.ac.za); Institutional Research and Ethics Administrator: 0313732375 or Acting Director, Research and Post-graduate support: [@dut.ac.za](mailto:@dut.ac.za).

Thank You

### **Level of upstream pharmaceutical sustainable supply chain management practices in Ghana.**

1. What is your general understanding of sustainably supply chain management practices?
2. To what extent has sustainably supply chain management practices been implemented in Ghana, especially within the pharmaceutical industry?

### **How upstream pharmaceutical sustainable supply chain management practices influence the performance of pharmaceutical companies in Ghana.**

1. How does sustainably supply chain management practices influence the operations of firms?
2. Does sustainably supply chain management practices impact the performance of pharmaceutical companies in Ghana? To what extent.

3. What are the major drivers of sustainably supply chain management practices with regards to performance within the pharmaceutical industry?

**The role of top executives in ensuring upstream pharmaceutical sustainable supply chain management practices in Ghana.**

1. How can managers influence upstream pharmaceutical sustainably supply chain management practices?
2. What roles of managers demonstrate the promotion of upstream pharmaceutical sustainable supply chain management practices?

**The role of the upstream pharmaceutical policy framework of Ghana on the supply chain on sustainability practices in the upstream.**

1. What are the policies that guide supply chain sustainability practices in the pharmaceutical upstream?
2. What issues under the policies (if any) guides firms towards the attainment sustainable supply chain practices?
3. Are there any challenges that firms encounter with existing policies on upstream pharmaceutical sustainable supply chain engagements? Explain.

Thank You

## **Appendix E: Interview Guide for Public Sector Institutions**

Dear Sir/Madam,

As part of the requirements to complete a PhD programme in the discipline of Public Management \ Public administration at the Durban University of Technology, I am conducting a study on a topic: Sustainable supply chain management practices in the pharmaceutical industry of Ghana. This survey is to understand the sustainable supply chain management practices within the upstream pharmaceutical industry in Ghana.

Please provide your expert opinion on the following statements. Please note that your responses will be treated with utmost confidentiality, information will not be divulged to any other party and anonymity will be ensured.

I look forward for the speedy return of the questionnaire.

For further queries, please do not hesitate to contact any of the people: The researcher on +223244518432 or [22175046@dut4life.ac.za](mailto:22175046@dut4life.ac.za), [gifty.kumadey@ttu.edu.gh](mailto:gifty.kumadey@ttu.edu.gh); The supervisor; [AlbertA@dut.ac.za](mailto:AlbertA@dut.ac.za); Institutional Research and Ethics Administrator: 0313732375 or Acting Director, Research and Post-graduate support: [@dut.ac.za](mailto:@dut.ac.za).

Thank You

1. What is your understanding of sustainable supply chain practices within the context of Ghana?
2. Are there efforts by government and government organizations to ensure that firms within the public sector are undertaking sustainable supply chain practices? Explain.
3. What are the policies that guide supply chain sustainability practices in the pharmaceutical upstream?
4. What issues under the policies (if any) guides firms towards the attainment sustainable supply chain practices?
5. Are there any challenges that firms encounter with existing policies on upstream pharmaceutical sustainable supply chain engagements? Explain.
6. What are the targets that set by government and government organizations to ensure that state entities adhere to sustainable supply chain practices?

**Thank You**

## **Appendix F: Ethics clearance letter**

## **Appendix G: Permission to conduct interviews at Ghana Pharmaceutical Industry**

## Appendix H: Letters of permission / Gatekeeper's letters



**Full Title of the Study:** Sustainable Supply Chain Management Practices in the Pharmaceutical Industry of Ghana.

**Names of Researcher/s:** Gifty Kumadey

**Co-Investigator/s/supervisor/s:** (Prof. Albert Tchey Agbenyegah)

### CONSENT

#### **Statement of Agreement to Participate in the Research Study:**

- I hereby confirm that I have been informed by the researcher about the nature, conduct, benefits, and risks of this study - Research Ethics Clearance Number: CID: YIGJD33MbF
- I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Lucia Addae

22nd June 2021 \_10am\_

Full Name of Participant.

Date

Time

Signature

I, Gifty Kumadey, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Gifty Kumadey

20<sup>th</sup> June 2021

Name of student

Date

Signature

Kenneth Boadi

24<sup>th</sup> June 2021

Full Name of Witness (If applicable)

Date

Signature

Full Name of Legal Guardian (If applicable)

Date

Signature

I, Gifty Kumadey, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

## **Appendix I: Turnitin report**